The RCEME QUARTERLY

Volume 3 JULY, 1951 No. 3

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THE RCEME QUARTERLY

The information and statements herein are not to be quoted as authority for action. The Quarterly is published to assist RCEME personnel in keeping abreast of current trends and developments and to circulate interesting news about the corps.

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EDITORIAL

We inaugurate in this issue of the Quarterly a series which we have titled THE SUGGESTION BOX. The purpose of it is to spread among workshop personnel in the commands, the thoughts that have made life easier for their colleagues elsewhere.

Every workshop has some little gadget or procedure of which it is especially proud. It may be a mechanism for lifting engines out of vehicle chassis, or it may be a jib crane similar to the one (in Vancouver) we illustrated on page 25 of our April 1950 issue.

Again, it may be some method of avoiding bottlenecks in paper work, or a means of assigning personnel more appropriately to jobs. Some workshops have an exceptionally fine lay-out, while others have made an excellent best of the difficulties under which nature or the QMG Branch has compelled them to work.

To this end, we circularized those of our associate editors who are Command EMEs, and the results of our chit appear for the first time on page 24 of this issue. We want particularly to emphasize that the mere fact that a gadget has been shown in the Suggestion Box does NOT mean that anybody can forthwith make it in any workshop. The proper authority must be sought, as laid down in the relevant orders. But we hope that these brainchildren, details of which we will publish from time to time, will stimulate others of the Corps to find means of saving themselves unnecessary work, and the taxpayer his money.

We would like to draw your attention to an article entitled "Cross Country Transportation" by Lt Col J. R. Johnson, of the RCEME Supplementary Reserve of Officers. This is not only a very well-thought-out article, but it also marks the first time that we have had a technical contribution to these pages from a member of the Supplementary Reserve. Here is a vast and hitherto untapped field of technical knowledge, and we would ask here and now that members of the Supplementary Reserve of Officers, RCEME, drop us a note and tell us what they could contribute to our fund of practical know-how or theory.

We think well ahead when we determine the technical contents of this Quarterly: contributors can have as long as they like to prepare an article. All we ask is that they eventually keep their promise as to delivery date and length.

****

IN KOREA

WITH THE 25TH BRIGADE

By Lieut R A Hill
25 Cdn Sp Workshop RCEME CA(SF)

After a three months interlude at Fort Lewis with the role of a makeshift static 2nd line workshop, 25 Cdn Support Workshop is now in Korea, set up in an ex-POW camp surrounded by hills, rice paddies and the all-pervading smell of night soil. A real estate agent would probably describe it "a choice site in a rapidly developing suburb" of Pusan, but it leaves something to be desired as the location for a Base Workshop.

Upon arrival in Pusan, we moved directly to our new home. Eight hours after our arrival, the work started to pour in. As it was nearly all connected with the movement of the brigade to the front, it was urgent and had to be done. The resulting combination of setting up shop, unpacking stores, chasing spare parts through formal and informal American channels, and trying to operate as a workshop with equipment that was still in the process of being de-preserved gave the general impression of a madhouse.

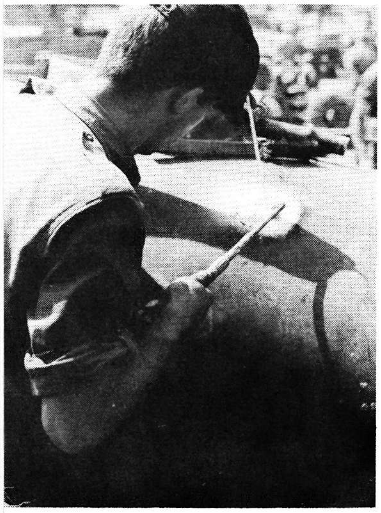
Somehow the work was done and some of the spare parts procured. Much credit is due to the individual tradesmen and SPSS storemen, who turned out the jobs despite tool and equipment shortages and very trying circumstances. We all heaved a big sigh of relief when the brigade moved out and we were able to devote some time to putting our own house in shape.

In order to accommodate the shop, a hangar type building some 400 ft by 100 ft is being erected in a nearby site and although it does not quite come up to the standard of the '100 man workshop', it will provide cover for operations. The building is a local pattern and was erected by native labour under RCE supervision. The sides and roof are of corrugated iron and internally it is a forest of 4x4 pillars which in some cases seem to be having difficulty in holding themselves up.

Care had to be taken to ensure that doors were put in only one side of the building as the high winds experienced locally would blow the roof right out. We are hoping that a layer or so of sandbags will help to keep it on. The floor is hard red clay, as is the surrounding area, but more suitable hard standing should eventually be forthcoming. The actual site is not too unsuitable, being close to a main road and not too

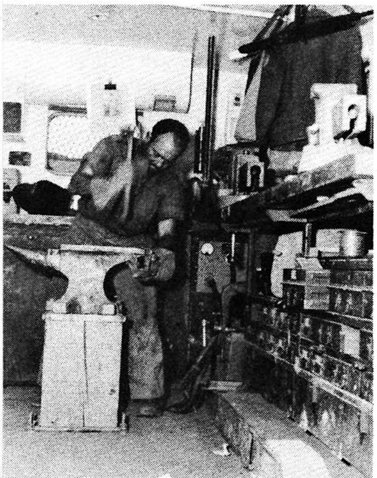
DPR(Army) photos

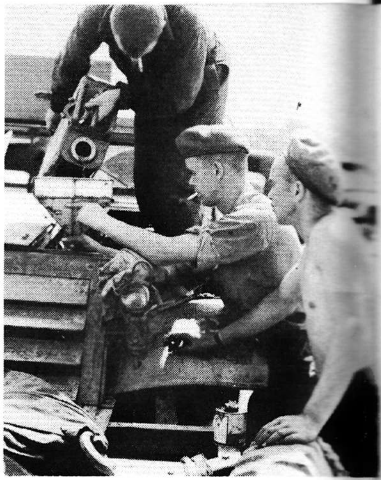
Cpl MacNeill (Great Village NS) taking a chore-horse generator apart.



Cfn A L Turgeon (Kenora Ont) welding over a bullet hole on a water trailer.

Cfn F C 'Shorty' Walters (Goderich Ont) straightening a broken section of a jeep bumper.

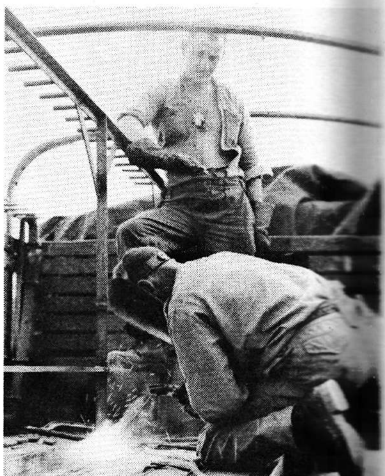




Cfn Bob Bertrand (Quebec) Gabriel Morin (Louisville PQ) and Ollie Olies (Toronto) filling a radiator with antifreeze.

Cfn J E Roberts (Kimberley BC) and T E McNeil (Westville NS) replacing head on LdSH AFV engine.

Cfn A W McMahon (Calgary) and Cfn R G Stooke (Meadow Lake, Sask) converting army truck into bulk stores lorry.



far from railroad facilities. One drawback to it, from a living point of view, is the large number of latrines left from the camp's POW days. Previous occupants either neglected to 'sign' the old latrine sites or else the signs were removed; in either case, it's hard to tell just where they are until it is too late. We are all becoming experts at moving in a hurry as further unsanitary conditions are uncovered. As the area is restricted in size and as we have no other place to go, being bound by the location of the workshop building, the whole effect is becoming that of a large-scale game of chess.

The country itself is much as was expected. Scenically very beautiful, it leaves much to be desired in the way of civilized activities. Pusan is crowded with refugees and the standard of living has been reduced to a very low level. We are approaching the rainy season and if the several rainy days we have already had are any indication of what is in store, we are not looking forward to it.

Right now, we have left the 'Electrical and Mechanical' part out of our title and nearly all members of the unit are hewers of wood and drawers of water -- as we set up our new camp.

Officers of 25 Cdn Support Workshop RCEME at Fort Lewis, Wash. Front row (l to r) Capt R A Auckland, Major W A Down ED, OC, Capt J B Dewhurst; back row: Lt Glasford (RCOC), Lt N G Lane, Lt R A Hill and Capt B A Beneteau.

191 CDN INF WORKSHOP

By WOII H Gallier RCEME

[This is a quotation (all but a few personal references) from a letter from the above warrant officer to Lieut 'Herbie' Popkin, DEME. -- Editors]

Our days are fairly long, with reveille at 0600 hrs, starting work at 0715 hrs and going right through until about 2100 hrs, or later if necessary. And now and again it does become necessary. Needless to add, we do stop for meals.

The weather so far has been just fair. No matter what kind we get there are complaints from all sides. If it's clear and hot, we have dust by the ton; and when it rains we are practically knee deep in mud. (To you fellows who were over in Italy, it's la meme chose!). So you can see what we are up against, and never satisfied.

We arrived in Pusan amid a blaze of glory, so as to speak. There were two bands on the dock-side; one American, who greeted us with "If We'd Known You Were Coming We'd Have Baked a Cake." Quite appropriate wasn't it? Then the Korean band added a couple of stirring marches. The Mayor of the city and his retinue, which included about a dozen of the local belles dressed for the occasion in their finest, with

Major R E Hallam, OC 191 Canadian Infantry Workshop RCEME.

Capt R A Auckland 25 Cdn Sp Wksp RCEME explaining firing power of 3.5 'bazooka' to Ethiopian officers of UN Forces.

sashes bearing "Welcome to Korea." Flowers were presented to several officers, who somehow or other looked rather unnecessary and out of place, but managed to keep their dignity until they came back on board when they quickly disposed of the bouquets.

As per, the disembarking procedure was slow and very tiresome. We were the last unit off the boat, which was about three hours after the first lot. And dressed in full marching order, you may well know it wasn't exactly comfortable.

I think our first impression of Pusan while riding out to the Staging Camp was the unpleasant, unhealthy or something smell. In parts it was terrific!! We soon learned the cause of it all. It appears there is little or no sewage system in the town, and all the waste runs along the roadsides in small drains, and in some parts small ditches. The natives clear these drains by scooping the waste out and throwing it over the road. They claim it helps settle the dust, and of that there is no doubt!! A very healthy atmosphere, don't you think??

The people in general seem quite a healthy lot; and while they are not too well dressed, they manage to look clean and tidy. We were quite impressed by their white even teeth. Their diet, being very simple, is without a doubt the reason. They don't seem to care at all for sweets.

The souvenir situation was and is disappointing. Somehow their wares are cheap and trashy, and mostly imported from Japan. So far, haven't seen anything I really like. The good old NAAFI is operating here, and I understand they keep a few souvenirs on hand, but imported from Japan.

The country we have passed through is scenically very lovely. Its most rugged and mountainous. The roads of course are in poor condition, and being dirt roads, become very dusty or muddy. So far, Seoul is about the only town one could call civilized, that is, in comparison with the outside world. And just now it is in a sorry state. Nearly every building carries a war scar. In normal times I imagine it is quite the busy place.

No doubt you folks have heard about the Canadians in action over here. They did a fine job crossing the 38th Parallel. The Royal 22nd were right in there and brought forth high praises to the Canadian Army. The RCR followed, and they suffered a few casualties, but held their own. The weather conditions were against them too. The PPCLI are back in at present and are doing very well up towards the north-west sector.

For awhile we were busy keeping up with the advancing troops. It seemed we were on the move every other day, with no time to carry out our share of the job of repairing the vehicles and equipment. However, the Brigade is more or less out for a rest period, and we are camped for a few days and hope to make short work of the backlog.

Had occasion to go up to HQ a week or so ago. I knew they were on the move, but hadn't any idea just where they were going to settle. Imagine my surprise when we reached the 38th parallel and kept going, as the Brigade signs were still popping up. We finally caught up with

Sgt E F Hodge (Smiths Falls Ont) and S/Sgt E N Bigley (Hamilton) comparing new modified heavier spring for jeep with the normal spring.

Cfn J E Brown (Seaforth Ont) tightening wheel bolts while Cfn W T Nickson (Public Landing, NB) holds brakes on. Pte E T Murray (Montreal) of R22eR looks on.

them about 3 or 4 miles north of the parallel. The artillery was still busy firing over a large hill nearby, so we felt for once we were right in the midst of things although we knew the Red Chinese were some distance away. In this particular sector in the eastern zone, our boys were about 10 miles over the 38th and still going.

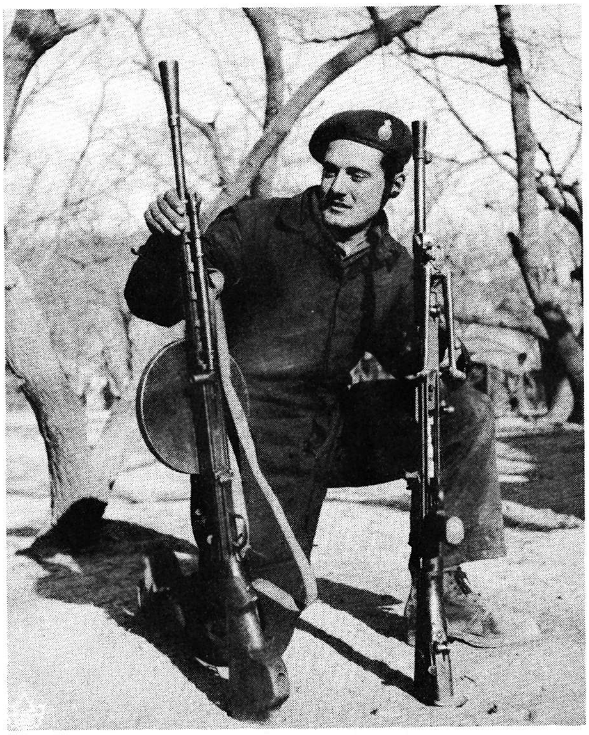
At present we are having a lot of rain. Understand the rainy season commences in July and continues for several weeks. From the looks of the weather this past few days, the rains have already begun.

Our office truck is well equipped and very dry. It is quite an improvement over the type of lorry we had in Italy. This one has a heating and air cooling system, which seems a luxury when you consider you are at war, and roughing it. The vehicle is American issue of course.

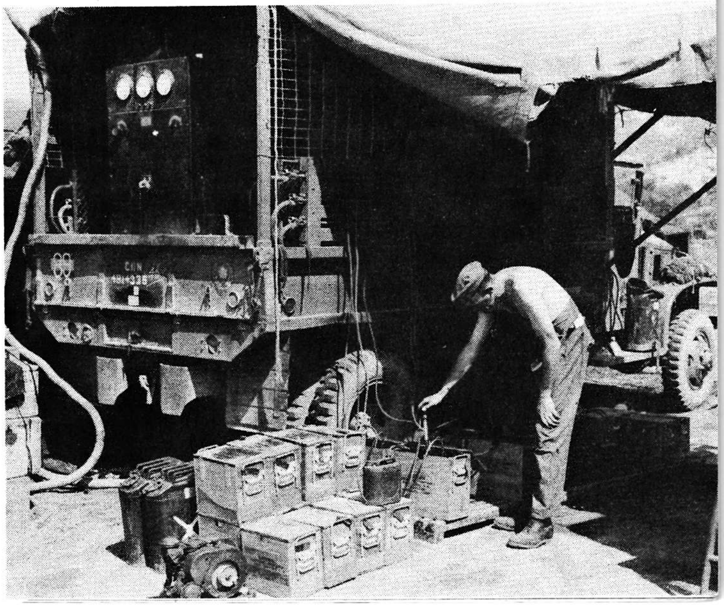
Rations too are very good. We have fresh eggs every morning with bacon a cereal and fruit juice. We get fresh potatoes most of the time too although the other vegetables are canned. Fresh fruit is issued in good quantities and often. Our only 'beef' at the moment is that we are not being issued with bread. Soda crackers sure get tiresome three times a day.

Mail service has been quite good. However, this past six days there has been no mail. We are led to understand that it is due to a change over from the USA mail service to the RCAF carrying it. Once they get into the run of things the mail may get through more regularly - at least we hope it will.

In closing I do wish you all the very best, and hope to hear from you sometime soon. You know what they say about mail being the greatest morale booster? Well, I think there is something to it.



Cfn Ed Higham compares a captured machine gun with a Canadian Bren gun.



Cfn L M Hayvren (Montreal) testing a portable wireless-set battery

RECOVERY

These three pieces on recovery came across our editorial desk more or less simultaneously. We feel that each of the three has an individuality about it which justifies our printing them together in one issue of the Quarterly. Need we say that in each case the ruggedness of the trip is glossed over in the casual manner. In these affairs, if one but knew for sure the trip would end happily, that would make it a joy-ride, almost. But life is like that -- one never does know!

..on the barrens

by L/Cpl M E Stoney

During the build-up for Exercise Sun Dog II there were numerous tractor trains proceeding to and from the Ghost Area. On 29 Jan 51 a message was received stating that a D7 tractor was disabled fifteen miles south of Hubbart Point, which is some 70 trail miles north of Churchill.

A crew consisting of Cfn J.R. Stevenson and R.F. Hudson, with myself in charge, was selected to recover the tractor. For equipment we were allotted one D7 tractor with blade, one Penguin Mk II and a 40 ton Rogers Transporter Trailer. It was not certain that this trailer could be used effectively for over-snow recovery, and it was being done as an experiment on this trip.

We left camp at 1630 hours on 29 Jan with Stevenson driving the 'cat', myself on the Penguin, and Hudson as radio operator. Our first stop was at the railway crossing approximately three miles from camp, where we rested for a few moments and had our supper. We changed drivers on the vehicles and gave Stevenson a rest, so he could get some sleep, as we proposed to drive 24 hours a day. The trailer started to bog down in the deep snow, and after proceeding approximately one half mile we found winching was necessary. The snow soon became too deep even for winching and we pulled the eye off the tongue of the trailer. We then hooked the cable round the end of the tongue, but it too broke off after we had travelled an additional 100 yards. We then resorted to bulldozing the trail, and at the same time radioed camp and asked for a new tongue to be sent out. In the meantime we tied the cable round the remainder of the tongue and proceeded slowly across the Churchill River.

At this point we lost the trail. We scouted around with the Penguin until we found a new trail which went up through a thickly wooded area, and we proceeded along this for about four miles. We stopped here and took off the broken tongue, as we had received a message that a new one was being sent out by Penguin with Captain Hewson, L/Cpls Miller and Hare; they eventually arrived at 2359 hours.

We kept in radio contact with this other Penguin, but they could not find us, so eventually we had to use the Verey pistol and fire flares until they found our position. The new tongue was installed in about twenty minutes and we made a brew of tea before proceeding on. The other Penguin started back to camp with the broken tongue, in order to have it welded in case we should require it again.

We left at 0130 hours on 30 Jan with Stevenson driving the 'cat', and travelled until 0700 hours, when we stopped for breakfast, consisting of weiners and beans. We refuelled the 'cat', departed at 0830 hours and travelled until 1130 hours, at which time we found to our great astonishment the trail ended.

We turned round and started back, and presently met a trapper who said there was a trail down the hill to Button Bay, however, we were unable to locate it even after an intensive search. The hills were too steep and rocky to traverse with our equipment, so we radioed camp and told them of our predicament.

We stopped for dinner which consisted of stew prepared by Hudson, but which no one ate. We then proceeded back down the trail to the Churchill River, where we met a tractor train on its way to the Ghost Area. This was about 1600 hours. We had our usual supper of weiners and beans at 1700 hours and set off once again at 1830 hours. I was now driving the 'cat' and Hudson and Stevenson were taking turns driving the Penguin. We crossed over the Hump and a few small lakes, then loaded the Penguin on to the trailer, as we were now on the right trail, and Stevenson and Hudson tried to get some sleep.

We continued on until about 0600 hours, 31 Jan, stopping about every hour during the night for coffee, in order to stay awake. On my last stop for coffee I sat down in front of the Penguin heater and did not wake up until 0800 hours; but we got under way again, and arrived at the fuel cache at North River at 1000 hours.

At this point we discovered a transmission oil leak on our tractor, and called back to camp asking that hypoid be sent out to us. We could not proceed because the oil level on the transmission was dangerously low. We waited there for 48 hours, until the Engineer Trial Team arrived bringing the hypoid, and we were all able to catch some much-needed sleep. Things were not too comfortable however, as the Penguin is not a good vehicle to sleep in, and we were not too warm in the sleeping bags. We were also getting good and tired of weiners, beans and stew. The Engineers arrived with the oil and gave us rations and cigarettes. After refuelling the vehicles and servicing the equipment we carried on to our destination.

From 1000 hours 2 Feb we were maintaining radio contact with camp every hour on the hour. We also had to change drivers on the 'cat' every hour, as the cold was so intense it was impossible to stay out longer.

At 1900 hours we stopped for supper, and suddenly a Bombardier stopped alongside us, and asked us to radio his position to camp, as he could not reach them. We acted as go-between for him and the camp as he proceeded up the trail. He was going to Hubbart Point to pick up L/Cpl Johnson of 23 Transport Coy RCASC, who had suffered second degree burns when a Chore-Horse exploded in his face.

We arrived at our destination at 2330 hours, 2 Feb, and stayed up to maintain radio contact between the Bombardier and base camp. However, we lost contact with the Bombardier at 0100 hours and waited for a tractor train to reach us which was coming down the trail. When it did arrive about 0500 hours the next morning we learned that the Bombardier had broken down, and that L/Cpl Johnson and the Medical orderlies were with the tractor train proceeding to Churchill. The tractor train radio was NS, so we wired camp giving the position of the train and its expected time of arrival in camp. We also informed them that the Bombardier had broken down some seven miles north of our position.

We slept until 0800 hours 3 Feb, and after breakfast —bacon for a change— loaded the disabled 'cat' on the trailer (this was the one we had originally set out to recover), but before we started we received instructions from camp to recover the Bombardier as well. We sent our Penguin up and towed the Bombardier back. We tried to start it several times but were unsuccessful, as it was completely frozen up. Accordingly we hooked it on to the back of the trailer with a triangular hitch, so that we would not have to steer it.

We left our position at 1500 hours and set off back to camp with Stevenson driving, myself on the Penguin and Hudson sleeping.

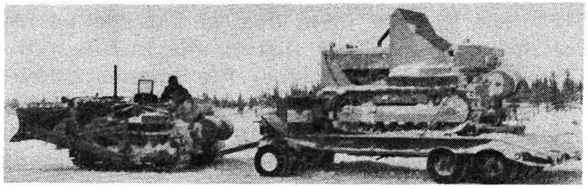
We carried on until 0600 hours 4 Feb, when we came across an RCE TD14 which had broken down on the trail. We radioed back to camp in order to get some information about this vehicle and when they were unable to, we went on down the trail towards North River and the fuel cache, as we were getting low on fuel.

We stopped for breakfast at 0900 hours when some Engineers with a Euclid tractor arrived and told us of the unserviceable TD14 which we had already discovered. We refuelled at North River and left at 1400 hours with Hudson and Stevenson in the Penguin.

At 2100 hours we made contact with camp and gave our position, but at 2200 hours when we tried to contact camp again we found our radio was NS, and in addition the heaters in the Penguin had broken down. We stopped to wait for daylight before crossing the Hump.

Stevenson now took the 'cat' and proceeded up the hill, and while he was about half way up and winching the trailer, the cable jumped and the trailer became unhooked. The trailer slid backwards down the hill but stopped in a snowbank before it reached the Bombardier, which we had left part way up as a safety precaution for just such an emergency. No damage was done to any equipment and we made way slowly towards camp, as winching was necessary for about a mile due to the heavy snowdrifts. We finally arrived at 1660 hours on 5 Feb.

We were glad to be back and get a shave, shower and sleep, and after a good night's rest were all ready to go again.



Effective 27 Jun 1951, DME became DEME ie, the Directorate of Electrical and Mechanical Engineering. In Command and Areas they have recognized the broader scope of the Corps activities with Command and Area EMES. Also, in the field there is the CREME. Now, in keeping with the ever increasing importance of the electrical side, the name of the Directorate will include the word "Electrical".

..on the muskeg

by Cpl R E Endall

During the summer of 1950 there were several recovery trips over the muskeg; this one I remember particularly, because of the bad weather and the urgency of the repair.

Word came to Captain Otto that two Penguins had broken down at Gordon Point approximately 25 miles from Camp, and it was most urgent that they continue their trip to the Broad River, with an Army Survey Party who had only very limited time to complete their mission.

The weather at this time was excellent, a lovely June day with the sun shining and the flies increasing in numbers. We loaded our camping equipment, supplies, tools and spare parts into our Penguin, and netted in our 29 set before leaving Camp. Our party consisted of Sgt Barrett, L/Cpl Miller, Cfn Stoney and myself, and we set out for Gordon Point at approximately 1600 hours.

Everything went fine and at 1700 hours we had made radio contact with 'Baker Dog Tare' which was our workshop call signal. We reported that we were past Half Way Beacon, and the trip was progressing favourably. We had spoken too soon however, because a short way ahead was some soft muskeg and we had to pick our way through it very carefully. Several times the Penguin sank two feet in the stinking muskeg, and we were afraid that the Penguin might become 'hung up' on a hidden rock. We were lucky however, and after driving very carefully we managed to reach the other side. We finally reached a creek, waddled through and washed off most of the muck.

We contacted the workshop by wireless at 1800 hours, told them that we had spotted one of the Penguins, and that it was mobile. We drove up to it and the driver, Pte Smythe, climbed out and informed us he would lead us to the other Penguin which was a couple of miles away, up on the ridge toward the Point. We followed Smythe to the location of the other Penguin, then pitched our tent and had a bite to eat before starting work.

While Sgt Barrett got supper we proceeded to remove the tracks on our Penguin and break the bogies to install new lower rebound springs. It was necessary to raise the vehicle to lift the body weight off the springs. Our equipment for this consisted of two 3-ton hand-operated hydraulic jacks and a wide assortment of odds and ends of lumber, consisting of everything from 2x6s to 6x6s, all about three feet long.

Our first attempt to raise the vehicle failed after the jack had reached its full height, because the weight of the Penguin had driven the base (a 2x6 plank 3 feet long) into the moss about 4 or 5 inches. We then took the other jack, using blocks to bring it up flush with the hull, and inserted this on top of the 2x6 which we thought should be close to solid bottom by now. We jacked it up again and the vehicle was raised 1 or 2 inches only, and we were forced to repeat this process several times, in order to raise it sufficiently to remove the bogies for repair.

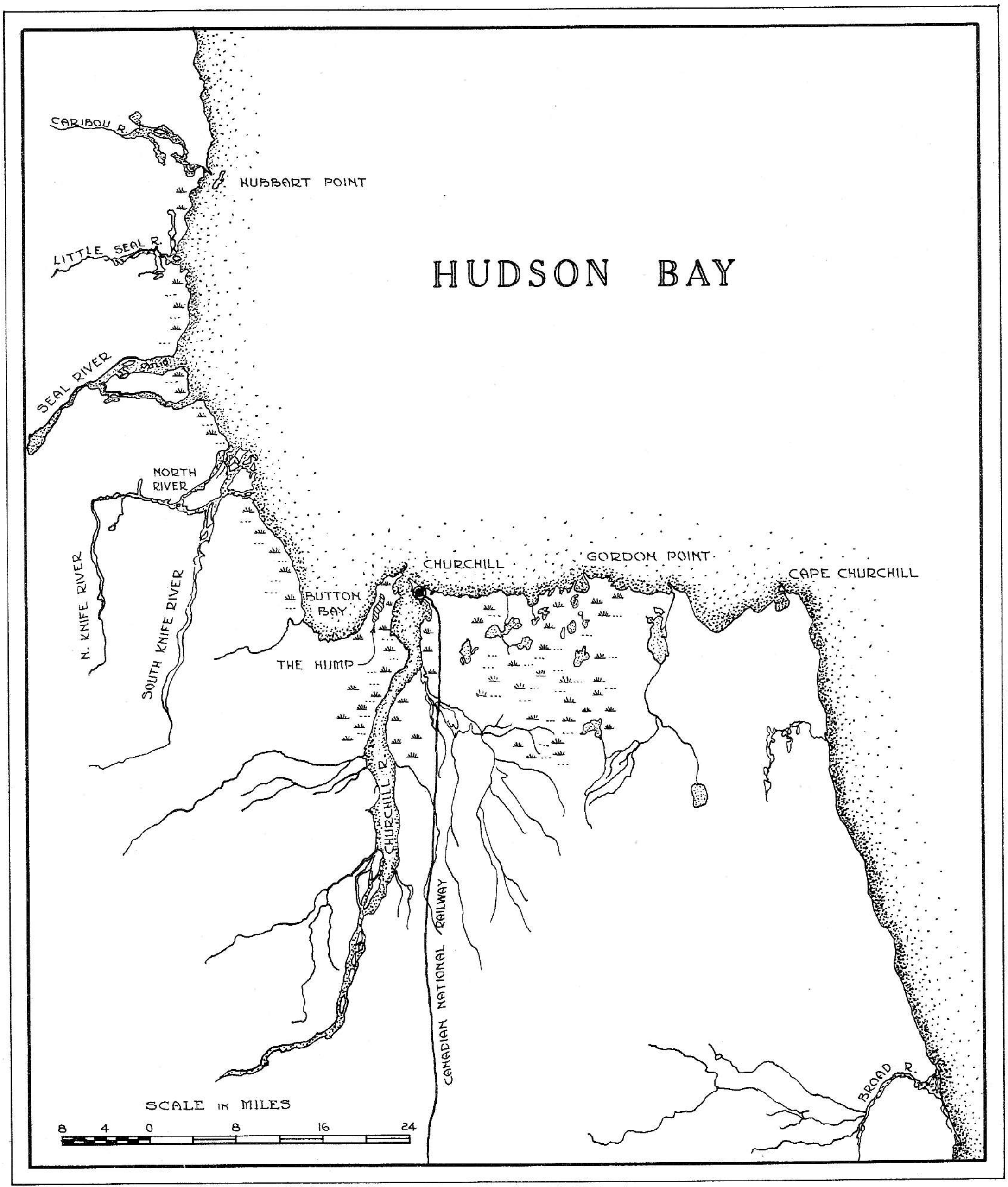
To our dismay we found that the bolt brackets were distorted. This worried us considerably, as we had no means of heating the metal to straighten them, so that the springs and spring bolts would line up correctly. We decided it was too risky to send the vehicle back to Camp, so we tried to line up the springs and spring bolts by means of a small pry bar and brute force. At last we were successful and without any undue damage, the bolts lined up without the springs, so we decided to quit for the night. We cleaned up our tools and equipment so we could find them in the morning.

By this time Sgt Barrett had supper well in hand and we enjoyed a delicious hot meal. By the time the meal was over and the dishes had been washed and put away it was nearly midnight. We had planned on a good night's rest, but we were sadly disappointed by an early morning rain, which developed into a deluge. Our campsite was on hard rocky ground with a soft moss cover, and it seemed as though all the rain that fell ran through the tent, and the moss soaked it up like a sponge. When dawn broke we were more than willing to get out of the sleeping bags and put on some dry clothes.

Morale had been high up to this point, but it was dropping quickly now. When we emerged from our tent the sky was a sad grey, and everyone was becoming depressed. However, we had promised that the vehicle would be ready to roll by noon, so we started to work again.

Both vehicles had broken four cleats, which we let the drivers work on in order to save time. One Penguin had both fan belts broken and Smythe's Penquin had to have one replaced, so after starting the drivers on that too we began working again on the suspension.

We drove our Penguin round to the windward side of the disabled one in order to break the force of the wind and the rain, which bothered us as we worked. We lined up the springs and began driving the bolts home, but as we had anticipated we ran into trouble with the bent brackets. By brute force again and with the aid of a crowbar we lined the bolts up sufficiently to get them started, and with a bit of encouragement from a 2-lb ball-peen hammer the bolts were



RCEME QUARTERLY MAP

persuaded to move, but they ran up against the inside bracket. However, with a little more serious encouragement from the hammer we managed to drive them home, at the cost of burring the threads on the bolts. While one man used a cold chisel and hammer to clean up the threads the others checked the tracks for serviceability and prepared them for replacing.

By 1100 hours this same day we had the tracks on, and with only track adjustments left we took a break for coffee and a chance to shed our wet clothing. While in our tent (with running water) the head of the Survey Party came in and began dressing us down rather severely for having stopped work. As he was a civilian and we had already promised him we would have it going by noon, and also because we were wet and miserable, we asked him to be patient and let us enjoy our break. He became extremely annoyed but we were so uncomfortable we didn't care too much.

As we came out of the tent the sky began to clear slightly and the rain to ease off. The ground was still soaked, however, and it was a wet job lying in a good two inches of water while inserting cotters in the track pins. We had to lie in the water again at the rear of the Penguin while adjusting the tracks. While we were doing this the Survey Party began to load their belongings and equipment.

1200 hours rolled round and we had about 5 minutes work left, so the job was as good as completed and everyone was happy again. While we gathered up our chisels and equipment, the Survey Party finished packing and loading and they finally started off.

We stood for several minutes and watched them drive away -- things began to look a little brighter now. We strolled back into the tent and started a good meal cooking.

..by air

By L/Cpl A.R. Miller RCEME

On the morning of 14 Feb 51 at 0900 hrs Cfn Prahm and I were called into the office before Capt Otto, who told us of a Penguin which was disabled just north of the Seal River. This is about 40 miles north of Fort Churchill by trail.

It was to be our job to fly up to the Seal River with the RCAF and contact the RCE Trial Team, camped at this point. It was prearranged that on arrival they would take us to the Penguin, and when it was repaired we were to leave it at the RCE Camp.

At 1300 hrs the same day Cfn Prahm and I reported to the airport with all our equipment and environmental clothing and were directed to a Norseman aircraft equipped with skiis in which we were to fly to the Seal River. After loading everything we had we climbed in, taxied out on to the runway and F/O Potter made his pre-take-off check.

At 1330 hrs we were airborne and headed north over the Churchill River and up the Coast of Hudson Bay to the Seal River. In just 20 minutes we were on the ground again, and waiting for us were a party of Engineers on a small strip cleared for the Norseman. We were then directed to the wannegan where Lieut Penny, who was in charge, offered us a hot cup of coffee. After a short chat on the pros and cons of Churchill, we worked out a plan to bring the disabled Penguin back to the campsite and repair it there.

Cfn Prahm and an engineer 'cat' operator proceeded up the trail for the Penguin with a TD14 tractor while I was employed in starting another TD14 and making the repair tent ready.

When Prahm got back we put the Penguin in the tent and started up the Herman-Nelson heater and went to supper.

By the time supper was over it was warm enough to work on. After the gas lines were thawed out, we were able to make a complete inspection of the vehicle. It was found that it could be put in A1 shape with the parts we had brought with us. I overhauled the distributor and put it back on, adjusted the carburetor, and the engine was in good running order.

I then started on the transmission while Prahm worked on the wireless 29 set. By 2359 hrs we were almost finished so we stopped for coffee served by the engineer night fireman

When 0200 hrs rolled round we had made our first test run, which didn't turn out very well, but after a few more adjustments the Penguin was in good shape. Cfn Prahm made contact with camp on the wireless set, proving that it was working, too.

We turned in for some much-needed sleep, as we expected the aircraft back in the morning to pick us up, but it didn't arrive until 1400 hrs that day. We wasted no time in loading our tools and equipment, and by 1445 hrs we were back at Fort Churchill unloading the aircraft, our mission successfully completed.

The RCAF and the RCE Trial Team were most co-operative and without them this job would have taken at least a week.

Repair by air in the North certainly speeds up operations, and we hope to use this method of travel whenever possible. A tremendous amount of time and effort can be saved. It is possible that 'Repair by Air' will also be feasible during the summer, as the north country is covered with small lakes where planes may land. If landings cannot be made the parts can always be dropped to the crew to make the repairs themselves.

PEDIGREED LUBRICANTS

We regret that lack of space has prevented the publication of another instalment in this issue of Lieut Mildon's excellent series on army lubricants. A last minute influx of new stories made it necessary to cut out some part of our material. Rather than leave over to a later issue news of a topical nature, it was decided to postpone the publication of this feature until the October issue. Our apologies go to both the author and his readers.

SCHOOL BOXING

GOLDEN GLOVES TOURNAMENT

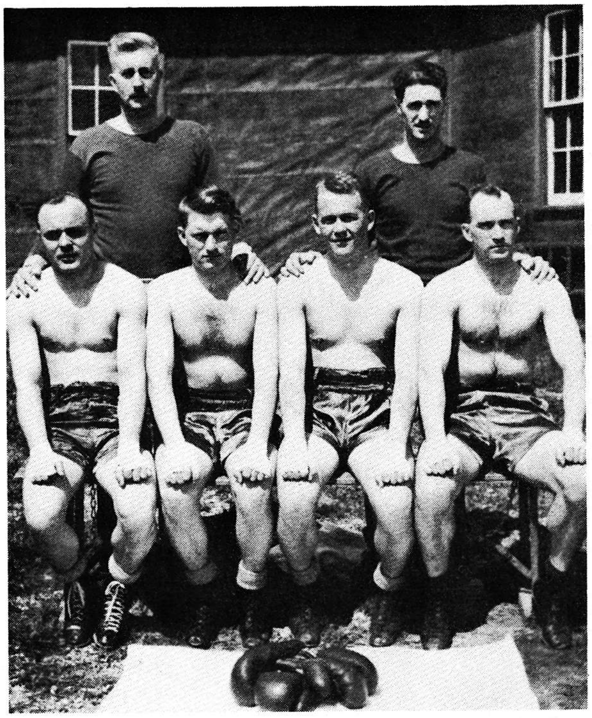
The Golden Gloves Boxing Tournament was held in Ottawa on the 30th and 31st May.

The RCEME School sent one contestant, Cfn Jack Farrow middleweight 160 lbs, who gave a good account of himself. (We still believe we have a Golden Gloves champion).

This account of his bout was reported in the Ottawa Journal 1 Jun. Quote:-

"In the next fight, the 160 pound novice semi-final, between Roger Thibeault and Army's Jack Farrow. Farrow exploded a right on Thibeault's chin midway in the first round and down he went. He staggered up, but Referee Joey Sandulo waved him away for the mandatory eight count. At eight Thibeault was hanging on the ropes. Sandulo told him to stand up, "get off the ropes - nine - ten, you're out".

"Then Sandulo raised Farrow's hand. Thibeault's corner beefed heartily that he 'wasn't down'. Referee-in-chief Gordon Montagano interceded and ruled the fight should continue, admitting that it is at the referee's discretion whether a fighter is helpless on the ropes. He claimed Thibeault was not helpless, saying, 'He was resting and didn't know enough to stand clear of the ropes'. So the bout continued and Thibeault took a decision." Unquote.



Front row (l to r); Cpl Haidinyak; Cpl Payne; Cpl Sugrue and L/Cpl Martin; back row; Sgt Brennan and Cpl Roy.

Cfn Jack Farrow

EASTERN ONTARIO AMATEUR CHAMPIONSHIPS

Four members of the RCEME School journeyed to Ottawa and participated in the Eastern Ontario Amateur Boxing Championships, sponsored by the RCAF, at Rockcliffe on April 23rd and 24th, 1951.

Cpl Steve Haidinyak, 146 lbs, was eliminated the first night on a split decision.

L/Cpl Earl Martin, 159 lbs, won the 10th bout of the first evening by a decision. In the finals he lost to the Eastern Ontario champion by a split decision. It was a hard fought contest and the decision amazed even the spectators.

Cfn Johnnie Sugrue, 175 lbs, lost by a TKO in the 14th bout of the first evening, having gone up against a human whirlwind. Losing to Eddie Senos is no disgrace for anyone!

Cfn Harry Payne, 157 lbs, was eliminated on a split decision in the 12th bout the first evening.

These men were handled by Sgt Jack Brennan and Cpl Art Roy, who also acted as manager and trainer respectively. An attempt is being made to revive boxing at the School and, considering the fact that these participants had only a week of training, their showing was very good.

CORPS ASSOCIATION

Lt-Col H G F Morgan, MBE; Col C R Boehm, MBE; Brig G M Grant, CBE; Maj-Gen E C Plow, CBE, DSO, CD, GOC Eastern Command; and Major O B Berringer.

By Capt A M Croft RCEME

Eastern Command recently had the pleasure of a visit by the Corps Association President and ex-DDME, First Cdn Army. It was for many the first opportunity of seeing Brigadier Grant since our departure from NWE six years ago, and his visit was most welcome.

At a luncheon held in the Officers Mess, R.A. Park, 5 May 51, Brigadier Grant spoke briefly on the problems of industrial and military needs for tradesmen. He cited instances of the industrial heads sponsoring the reserve army, even though the future disposition of their key men was in question. Co-operation between industrial and service needs was of utmost importance. The luncheon was attended by Active, Reserve, and Supplementary Reserve officers, heads of the technical and vocational schools, and prominent industrial heads. Due to a slip of the Chairman's tongue (Major O B Berringer) Brigadier Grant was promoted to a pre-war rank of Lt-Gen instead of Lt-Col.

Brigadier Grant's visit coincided with a visit from the Director of Mechanical Engineering. At a cocktail party old acquaintances were renewed, and by the end of the evening there were many fast friendships. A good time was had by all!! In spite of the party, a fishing trip was laid on for Sunday. No official figures are available on numbers caught, numbers almost caught, type and species, and trades-pay applicable.

The Brigadier's short visit concluded with a tour of 20th Tech Sqn RCEME shop, and the plant at Cossar (Canada) Ltd, conducted by Major Berringer, OC of the Reserve Force unit.

We in the Maritimes wish to express our appreciation for Brigadier Grant's visit. Sometimes we feel we are a long way from Ottawa (and still further from Toronto) and such visits do a lot to keep the Corps together.

VANCOUVER GROUP

At a meeting of the Vancouver Group, held on May 17th, in the Jericho Beach quarters of the RCEME, the following officers were elected for the year 1951 - 1952: President, Col N. C. Sherman; Secretary, Lieut J. McCann.

Among several items of business discussed at this meeting, it was decided to donate the sum of $25 towards the personal expenses of Cpl J.B. Robertson, 216 Workshop RCEME Chilliwack, B. C., an outstanding marksman who has qualified for Bisley this year.

Cpl Robertson will have the benefit of Capt M. M. Morgan's coaching. The captain, of 10 Coy RCEME, Winnipeg, and an experienced Bisley shot, is also a member of the team. We know all members of the Corps will wish them both lots of success.

Also present at this meeting and introduced to the membership was the new Area EME, Major J. J. Garnett, who was recently transferred to Vancouver to replace Major H. W. Hagey, now in DME. We hope that Major Garnett will enjoy his appointment to 'Canada's Evergreen Playground'.

NIAGARA GROUP

The Niagara Group held its monthly meeting Friday, Mar 16, 1951, in the Officers' Mess, Burlington St Armoury, Hamilton. After a short business meeting Lt Col Bruce McAdam introduced the guest speaker, Col T. M. Medland, Executive Director of the Association of Professional Engineers of the Province of Ontario.

Col Medland gave a very enlightening talk on the manpower situation in Canada and the need for compulsory national registration. A general discussion followed after which the meeting adjourned.

Straight to the boss the grandmother came,
What does it matter her station or name?
And she softly said with no trace of guile,
"I've been with the firm a long, long while,
And I'd like to ask for some time away,
For I lost my grandson the other day,
And this afternoon he is 'Laid to Rest,'
And, of course, she was granted her sad request,
And off she skipped gay as a lark,
To Ladies' Day at the baseball park!

-- The Westinghouse News

WOMEN'S AUXILIARIES

RCEME Women's Auxiliaries are being sponsored by the Corps Association. To quote from the Constitution adopted by the first chapter their objects are:

"(a) To provide comforts to soldiers of RCEME in the field against the enemy;

"(b) To assist families of soldiers serving with RCEME in the field as the need arises;

(c) To act in such capacity as may be required by the national interests in furthering the comforts of RCEME personnel."

Many now serving with the Corps will remember the benefits that accrued to them due to the efforts of the Women's Auxiliaries and will be glad to hear of their revival now that units and troops of the Corps are again in the field.

The RCEME Women's Auxiliary, Toronto, held its organizational meeting on the 17th of April, 1951, at the Officers' Mess of the 4th Technical Regiment RCEME, 132 St. Patrick Street, Toronto. Eighteen wives of Officers and ex-officers of the Corps were present.

A provisional executive was elected as follows: President, Mrs. LeSueur Brodie; Vice-President, Mrs. J K Bradford; Treasurer, Mrs. F D MacDonald; Press Secretary, Mrs. J Butterill; Corresponding Secretary, Miss June Dunn.

The Auxiliary's first activity was a Silver Tea held at the home of Mrs. George Grant on June 3rd. The tea was very successful and provided funds with which cigarettes for RCEME personnel in Korea were ordered.

It is the hope of the Corps Association to see these activities started wherever there is a Corps Association chapter.

RESERVE FORCE

Changes of command in Montreal

Lt Col L. Martin, MBE
(Salmon Studio photo)

Lt Col A.G. Edward, MC, DFC
(David Bier photo)

On the 16th of January 1951 the command of 3rd Tech Regt RCEME was assumed by Lt-Col A.G. Edward, MC, DFC, and on the 1st of February Lt-Col L. Martin, MBE, became the new Officer Commanding the 2nd Tech Regt RCEME.

Lt-Col Edward, the new OC the 3rd Tech Regt RCEME, has been the 2IC since its organization on 2 Feb 50. Previous to the re-organization of the RCEME Reserve Force he commanded 27 Med Wksp RCEME (RF). Lt-Col Edward served from 1917 to 1919 in the Royal Flying Corps where he was awarded the MC and DFC. He graduated from McGill University in Civil Engineering in 1924. In World War II he joined 4 AFW RCOC, later transferring to RCEME in May 1944, serving in UK and NWE.

Lt-Col Edward succeeds Lt-Col J.E.H. Stethem as OC 3rd Tech Regt. Lt-Col Stethem has commanded 3rd Tech Regt since its organization and was OC HQ RCEME 2 Corps Troops from 1 Jan 46 until the re-organization of the RCEME Reserve Force on 2 Feb 50.

Formal hand-over ceremonies were held on the 2nd of April at 3rd Tech Regt and were attended by Col W.C. Dick, OBE, Chief of Staff of Quebec Command, Lt-Col A. Miller, Command EME, Lt-Col A.J.R. Stethem, OC 202 Base Workshop and Major R. McLarnon, OC 4 Coy RCEME.

Lt-Col Martin, who now commands 2nd Tech Regt, is a native Montrealer and a graduate in Mechanical Engineering of Clarkson College of Technology, Potsdam, NY. He served in the

Canadian Grenadier Guards from 1939 to 1942. In the latter part of 1942 he proceeded to UK and later served in North Africa, Sicily, Italy and NWE. During this period he was awarded the MBE at an investiture by His Majesty at Buckingham Palace. In addition he was mentioned in despatches.

The retiring OC, Lt-Col L. I. Playfair, who has commanded 2nd Tech Regt since its organization on 2 Feb 50 and previously been in command of HQ RCEME 3 Div since 10 May 46, turned his command over to Lt-Col Martin in an impressive ceremony attended by Lt-Col A. Miller, Lt-Col A. J. R. Stethem and other RCEME officers of Quebec Command.

4th Tech Regt

"THE GUNNERS ARE HOLDING A SHOOT, CALL RCEME"

This familiar cry went up from the University Armoury in Toronto when on the 16 Mar 51 the 29 Fd Regt (SP) RCA was scheduled to hold a three day shoot at Meaford AFV Ranges.

In answer to the artillery's plea, St. Patrick Street's 4th Tech Regt RCEME formed an LAD composed of 21 all ranks, plus two attached officers, and nine venicles. Equipment and stores were obtained to enable the unit to carry out 1st and 2nd echelon repairs on vehicles, artillery pieces and wireless equipment. Previous experience on smaller exercises determined the scale of stores to be carried.

Captain L. R. Aiken was OC of the LAD with with Lt H. D. Plunkett as 2IC and WOI H. C. Geddis as RSM. The tels mechs from 'A' Sqn were Cpl McKinnon, Cfn Beals and Carson. 'B' and 'C' Sqns supplied vehicle mechs and recovery troops in the persons of WOII Steer, Sgts Ransom, Craig, Lane, Fryer and Cpl Caughey. Cpl Jones and Cfn Lister of 'D' Sqn were present to carry out emergency welding jobs. Major W.H. Ackhurst and Lt E. J. T. Hanson "went along for the ride" to act as observers and gather information for future exercises.

A former officer of the Regiment, Capt R. E. Austin, now with the Composite Garage in Toronto, supplied the stores required and accompanied the LAD as liaison officer. The 'M' Lorry was used to carry the spare parts as it could be locked and this relieved the unit of guard duties at night. A 'three tonner' carried petrol and oil in drums fitted with rotary pumps for emergency servicing enroute. A 'Z' Lorry was fitted with a 19 wireless set for the LAD's own use and also carried a quantity of spare parts and wireless components. This vehicle was manned by Capt Hipwell and three tels personnel. The remaining six vehicles consisted of a Mack Breakdown, three 3/4 tons, a KL Welding Lorry and a jeep.

RCEME vehicles joined the Gunners at University Armoury and the convoy of twenty-seven vehicles in all moved off at 2000 hrs 16 Mar 51. The FATs provided the LAD with plenty of headaches enroute and the Breakdown substituted for one lazy Quad (4 wheel-drive tractor) until a spare was provided ten miles along the route.

When a casualty was spotted the jeep, Breakdown, and 'M' Lorry stopped to carry out whatever repairs were possible, or impossible, as most seemed at the time. The 'M' Lorry generator provided emergency lighting and carried the fitter kits. Although five casualties were encountered between Toronto and Barrie, the last of the convoy together with recovery vehicles arrived in Barrie only ten minutes behind the main body. A half hour break was laid on at Barrie and during this time the RCEME mechs were busy correcting all defects noted on the trip up. The remainder of the trip was marred by only one incident and the petrol carried in the 'three-tonner' fixed this as one of the FATs ran out of gas.

The convoy arrived at the Meaford Ranges

a distance of one hundred and twenty miles from Toronto at 0330 hrs 17 Mar and after a snack in the canteen, everybody 'hit the sack' at 0400 hrs only to be aroused at 0600 hrs to prepare for the day's work. The entire day was spent on recovery and repair of quads in the gun position which was covered with a three inch layer of snow and criss-crossed with irrigation ditches and AFV tracks. Transfer cases went on the 'fritz' in nearly all the quads and the scope of repairs seemed to cover all of the first three 'echelons'. Work on the guns was carried out under the supervision of WOI Forward, a unit sergeant major of 'D' Sqn, assisted by Cpl Fowler.

After 'winding up' in Meaford, the convoy left for home at 1330 hrs on the 18th having already sent an FAT and jeep, both with clutch trouble and manned by LAD mechs, to limp in on their own if possible. Five miles northwest of Barrie the crippled FAT was picked up and placed on suspended tow. When the convoy arrived at Barrie defective braking mechanism was discovered on one of the gun limbers so the LAD took over and towed the limber from there using one of their own 3/4-tons. Fifteen miles south of Barrie the convoy came upon the crippled jeep and it was taken in tow by the LAD's 'three-tonner'. Aside from the three incidents just mentioned, the trip back to Toronto was more successful than the trip up and both Provincial and Municipal Police Departments did a splendid job of traffic control throughout the entire journey, both going and returning.

This being the largest exercise that 4th Tech Regt had participated in, many lessons were learned and it is concluded that the Mack Heavy Breakdown (6x4) is comparatively useless in country which is sandy, boggy or snowed-in whereas a Diamond 'T' Medium Breakdown (6x6) would prove invaluable. This may be illustrated by the fact that when it was found impossible to use the Mack, the 'M' Lorry was taken into the gun positions with relative ease and was used on this exercise to winch out the guns together with their limbers at the conclusion of the shoot. This course of action was necessary because the quads bogged down at the gun positions. The third point and probably the most important lesson learned was the undeniable fact that long weekend schemes of this type are important from the standpoint of RCEME training. The experience gained by all concerned is comparable to that which would be gained under operation conditions.

[We regret the lack of captions to the pictures accompanying this story, but the ones used were selected from twenty-two negatives supplied by 4th Tech Regt and time did not permit the securing of captions. We trust those most interested will recognize themselves. --Eds]

8th Tech Regt

Organized by Major E. H. Goodwin and Capt V. F. Barclay, a keen interest has been taken by members of the unit Rifle Association in full and small bore shooting, and they have posted scores as good as any of the units in the Vancouver area. Interesting inter-unit shoots with the Duke of Connaughts' Own Regt and the Irish Fusiliers were held and tentative arrangements have been made to broaden the scope of these shoots to include other units in the area during the fall and winter of 1951 - 52.

Lt-Col W.E. MacInnes, OC 8th Tech Regt, has been instrumental in organizing a unit Cadet Corps. The boys are recruited from the Vancouver Technical School and are very keen and interested in RCEME Training. Some of these Cadets have accompanied the unit on schemes to Chilliwack and indications are that they will provide a good potential of future recruits for the unit. The present strength of the Cadet Corps is 60, with an average turnout of 45.

Duration of the Summer Camp (Vernon, BC) this year will be one week — July 8th to 15th -- and between the 8th Tech Regt of Vancouver and 40th Tech Sqdn of Victoria, it is expected about 60 men will attend. The Vancouver and Victoria units will be joined enroute by the Wheeled Vehicle Troop with HQ in Vernon, and the whole will proceed into Camp together.

—Major J. T. Whiteoak,
Publicity Member,
Vancouver Group.

26th Tech Sqn

On Monday, 9 Apr, the personnel of 26th Tech Sqn were alert and ready for the arrival of Brig G. Walsh, CBE, DSO, CD, Commander Eastern Ontario Area, who was to come that evening for his annual inspection of the unit.

Because of inclement weather it was held expedient to have the inspection indoors. On his arrival Brig Walsh was greeted by the Officer Commanding, Major G.T. Burgess, and was honored with a General Salute. He then proceeded to inspect the Squadron and on its conclusion, complimented the men on their fine turn out.

The Brigadier expressed a keen interest in our mobile equipment and during the evening he was given an opportunity to see unit craftsmen using this equipment. On this particular phase of his inspection he came upon Cpl Wally Wittenberg of the Recovery Troop, who had served with Brig Walsh in the same Div in the African campaign. The unit was fortunate, said the Brigadier, to have as instructors men who had proven themselves so competent on active service during the war.

After the inspection was over, the Commander and his aides, Major R.C. Lane, Area EME at Kingston, and Major Noble (who incidentally made an admin inspection in next to no time that missed nothing) were entertained in the Officers' Mess. Later in the evening the sergeants were happy to be their hosts where everyone rounded off a pleasant evening recalling places and people they had known during the war.

Brig Walsh, WOII Stan Laing and Cfn Les Stone in 'M' Lorry.

26th TECH SQN INSTRUCTORS
(Left to right, front then back row)

Cpl Wally Wittenberg -- Brit Army 1940-46; served in Africa, Italy, NW Europe; workshop LAD 6 Armd Div RASC.

WOII Paul Morrow -- RCASC 1940; RCOC(E) 1942 then RCEME; instructor Barriefield, Wood-

stock, London. WO in chge recovery troop.

WOII Lloyd Pushman -- RCOC(E) 1942; 1 Cdn Base Wksp. Machine shop instructor, instrument troop.

WOII Stan Laing -- RCOC(E) 1942; instructor Barriefield artizan school. WO in chge of machine shop and instrument section.

Sgt Tony Landry — CA(A) 1939-45. GMT instructor.

S/Sgt Stan Davis -- NPAM, overseas 1940; trans to RCEME and served with 3 AFV Tank servicing unit NWEurope. Instructor in instrument section.

Cpl Gerry Carriere -- enlisted 1943; 1 Adv Base Wksp; volunteer to Pacific Force. Instructor wheeled veh and recovery troops.

WOII Orv Westcott (missing from picture) — CA(A) 1939-46; took 3rd radar course in Canada; radar inspections Pac Comd. Tels instructor until joining 27th Bde.

The Sergeants' Mess of 26th Tech Sqn, RCEME, Ottawa, commemorated the formation of the Corps with their annual dinner on Saturday, 12 May. Guests and members of the mess to the number of 76 enjoyed an excellent dinner and some varied entertainment.

After the toast to His Majesty the King, proposed by QMS Lloyd Pushman, the guests were officially welcomed by RSM Ed McDonell. A toast to the ladies by Sgt Wilf Sauve was replied to by Mrs Larry Laplante. This was followed by a toast to the Unit by S/Sgt Stan Davis. Capt Tom Wood, representing the OC who was unavoidably absent from the city, in his reply briefly traced the history of the Corps with particular reference to 26th Tech Sqn, alluding to the various names under which it had operated since it was first formed in 1942, as an RCOC unit.

The evening concluded with dancing and refreshments. The affair was voted the best yet and special mention should be made of the work of the entertainment committee under Mess President Stan Laing. Members of the hard-working group were Messrs Gates, Provost, Knoll, Gravelle, Robillard, Laplante, Bouthilette and Westcott.

* * * * *

The Unit has lost two valued NCOs in QMS Orv Westcott and Sgt Wilf Sauve, who have joined the 27th Brigade. We wish them the best of luck.

33rd Tech Sqn .

The 33rd Tech Sqn, Sudbury, took on the job of paper boy to the more than 1000 subscribers of the Sudbury Star who live in Espanola and district. Because of the flood in the Vermillion River area, the Department of Highways closed the road to "all traffic" and the army was called on to make deliveries.

Our pictures show (left) Cpl Bill McKay and Sgt Lou Ellwood clearing out the ice from their truck after fording the 3 1/2 feet of water which blocked the road from Sudbury to Espanola.

In the other picture, Roly Varieur Sudbury Star maintenance foreman, holds the extension tube or 'snorkel' attached to the exhaust for fording the flooded road shown in the background. (Sudbury Star photos)

AUTOMATIC TRANSMISSIONS

By WOII G. CHARLES, RCEME

This, the second of two articles in the series, gives an outline of how torque converters operate, and describes some of the different types used in automatic transmissions today. Certain less important phases of operation are not described in order to avoid confusion and to keep the article within bounds of length.

The transmissions discussed in the previous article made use of various forms of reduction gear trains to increase the engine torque before applying it to the rear wheels. The same purpose can be accomplished by using a torque converter. This device is by no means new, having been invented in Germany and extensively used as a marine gear speed reducer as early as 1905 -- just one year after America's first attempt at an automatic transmission. Inherent limitations prevented its use in the automotive field until the early '30s when it was first adapted for service in London's omnibuses. It was still far from perfect, however, and several more years elapsed before it appeared on motor coach transmissions in North America. Further development resulted in the converter being gradually taken into use in heavy construction machinery and, during and after World War II, in tanks.

Continual refinement since that time has seen the converter incorporated in several automatic passenger-car transmissions manufactured in both Canada and the United States.

As with the fluid coupling which has already been discussed, there is no mechanical connection between the converter's input and output shafts, all torque being transmitted by hydraulic means. Here the resemblance ceases, and where the coupling acts much the same as an ordinary friction clutch the converter actually increases the turning effort or torque applied to it. To explain how this is possible may prove a little difficult in an article of this nature, but the following may help to illustrate the point.

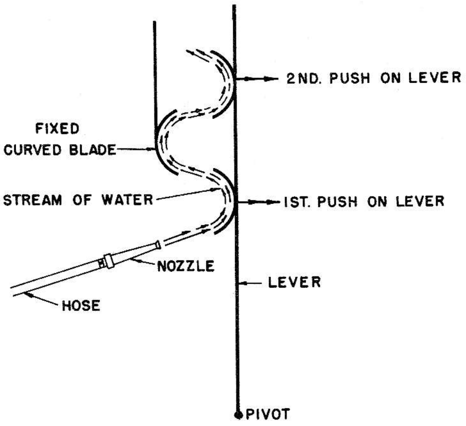


Fig 1

Suppose we assume we have a lever, pivoted at one end and fitted with a curved blade at its opposite end, somewhat like that illustrated in Fig 1. Now, if the lever is held stationary and a stream of water is directed at the curved blade by means of an ordinary garden hose and nozzle, the water will strike the blade, exerting a push against the lever, and at the same time will be deflected by the curved blade and redirected back in the general direction from which it came, also dampening our ardour for learning if we have been caught carelessly standing behind the hose nozzle. But suppose another curved blade is placed in front of the returning stream of water. Now the direction of flow can again be reversed and redirected into its original direction. Then if our lever were to be extended and fitted with still another curved blade above the first one, the stream of water could be made to exert another push at the lever. We can continue adding blades -- each set increasing the push on the lever – until all the energy in the stream of water has been expended and it ceases to flow.

Now, if we were to mount on our pivot a number of levers and curved blades in the form of a wheel, place a stationary blade in front of each lever blade, replace the hose and nozzle with a centrifugal pump and enclose the whole in a housing, we would have a torque converter. All that remains is to straighten out our nomenclature.

The pivot, to which the output shaft is fastened, together with the number of levers, becomes the 'turbine rotor'; the stationary blades with their mounting become the 'reaction member'; the centrifugal pump which is driven by the engine still remains a 'pump'; and each set of turbine blades together with their matching set of reaction blades are known as a 'stage'. Thus, if there were three blades on the end of each lever and three corresponding blades on the reaction member, we would have a three-stage converter. In actual practice it would be necessary to devise a means of forming each set of blades into a circle so that the water leaving the last set would be picked up immediately at the center of the pump, something like the cross section shown at Fig ; also oil instead of water would be used as the torque-transmitting medium.

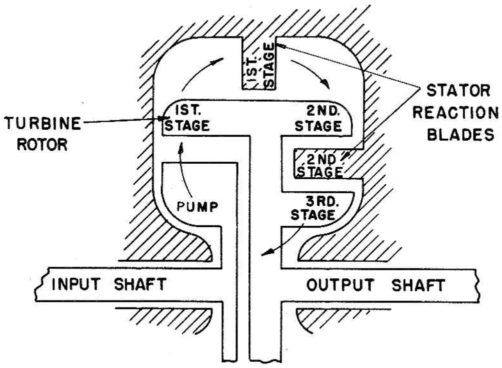


Fig 2

Do you have the general idea?

You can see that whereas the fluid coupling has only two sets of blades, an impeller and a runner, the torque converter is of somewhat more complex design and operates in a different manner. The greatest push or torque is applied against, and transmitted by, the turbine when it is held stationary, gradually decreasing as the turbine starts to turn and pick up speed. If we refer back to our imaginary converter we will see why this happens.

As the turbine begins to rotate and pick up speed the turbine blades begin to move away from the reaction blades and start to overtake the pump blades which are driving fluid against them. As a consequence the faster the turbine turns the less will be the push exerted against the turbine blades, less push will be returned to the reaction blades, and less push will in turn be redirected to the next turbine stage, until a point is finally reached where the turbine is travelling almost as fast as the stream of fluid acting against is, and torque multiplication ceases.

This is just what we need for a perfect automatic transmission. Instead of having sets of gears, each with a fixed reduction ratio, we have a torque converter, giving us an infinitely variable 'gear' ratio. Whenever the vehicle approaches some obstacle which causes the output shaft to slow down, torque multiplication automatically increases. As soon as the output shaft again begins to approach the speed of the input shaft torque multiplication automatically decreases.

There is only one big drawback and this is probably what held up the introduction of the torque converter into the automotive field for so many years. As the speed of the turbine begins to approach impeller speed the stream of fluid deflected back by the turbine blades no longer has sufficient velocity to push against the face of the reaction blades and instead actually begins to push against the back of the next reaction blade in line. The reaction member is now obstructing the fluid returning to the pump and efficiency begins to drop very rapidly. The point at which this occurs depends to a large extent on the shape of the turbine and reaction blades and on the capacity of the pump. Generally speaking, converter efficiency starts to drop rapidly when turbine speed approaches one-half to two-thirds pump speed. This is of no great importance where the engine is required to drive a comparatively heavy equipment such as a tank or a tractor, the transmission being in 'low gear', as it were, most of the time anyway. But where

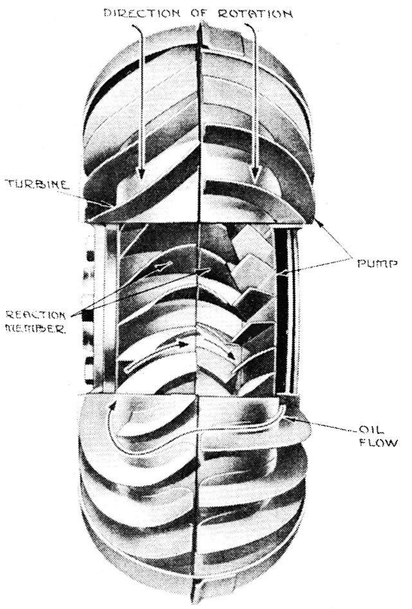


Fig 3 - Oil flow through single stage converter

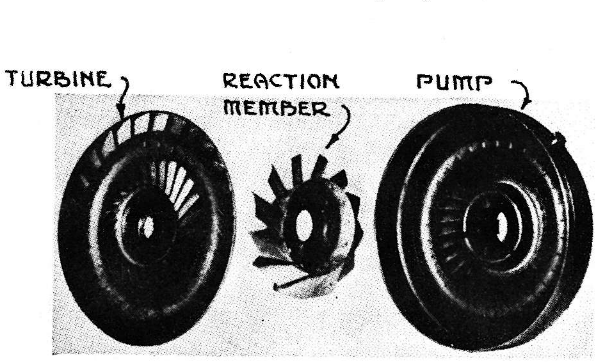


Fig 4 - Exploded view of single stage converter

a comparatively powerful engine is driving a light vehicle the results are not so satisfactory.

This obstacle can and has been overcome in any one of several different ways. One method is to disconnect the converter from the power train and automatically engage direct drive as soon as converter efficiency has passed its peak. This method is generally used on converters which employ several stages to give a high torque multiplication and which are consequently of complex design. Such converters are found on large motor buses, one being illustrated at Fig 6. No mechanical transmission gearing is used except reverse. All low speed driving is done through the converter and as soon as the vehicle has picked up a predetermined speed the converter is automatically disconnected and all further operation is in direct drive. The Packard Ultramatic transmission, which has a two stage converter, employs a slightly different solution. Here, instead of disconnecting the converter, a clutch is used to lock the pump and turbine together to obtain direct drive.

Converters used on other passenger cars employ still another method to overcome this problem. In these, the reaction member is mounted on an overrunning clutch which allows it to turn freely in one direction but not at all in the other. Here, as soon as the fluid leaving the turbine begins to push against the back instead of the face of the reaction blades the reaction member begins to turn with the pump and turbine and, instead of being a converter, the mechanism becomes a fluid coupling.

Torque converters adapted to passenger car transmissions require as simple design as possible. There are various reasons for this; cost and mass production problems being but two. Also, complicated multiple stage converters having a high torque multiplication are not absolutely necessary. This is because comparatively powerful engines, requiring a minimum of gear changing (or torque multiplication) in normal driving, are used — witness the Hudson and Chrysler previously discussed, both operating satisfactority with transmissions having only two forward gear ranges. This resulted in single stage torque converters being used on most passenger car automatic transmissions, the Packard Ultramatic being the only exception, as far as the author knows.

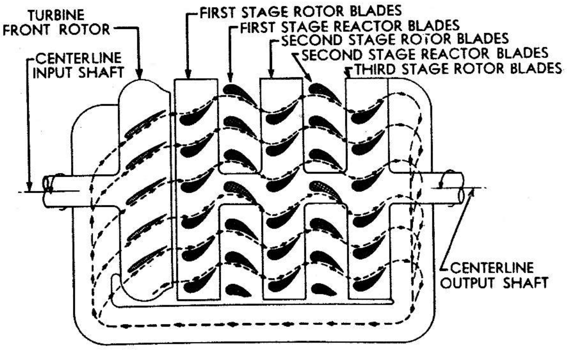


Fig 5 - Oil flow through multiple stage converter

In the single stage converter only one set of turbine blades and one set of reaction blades are used and torque multiplication is achieved by redirecting fluid from the reaction blade back into the pump in such a way that it augments the force of the fluid leaving the pump to push against the turbine blade. Here torque multiplication begins to decrease as the turbine picks up speed and tends to pump fluid in opposition to the converter pump. The torque multiplication that can be obtained in this way is rather limited and, in addition, another problem presents itself. As has been stated, the point at which converter efficiency drops off depends on the shape of the turbine and reaction blading. Thus if the blades are steeply curved, giving the highest initial torque multiplication, efficiency will begin to drop off too soon limiting the effective range of the converter. And conversely, if the blades are not steeply curved the effective torque multiplying range is extended but the initial torque multiplication becomes too low to be adequate. There are also two different solutions to this problem.

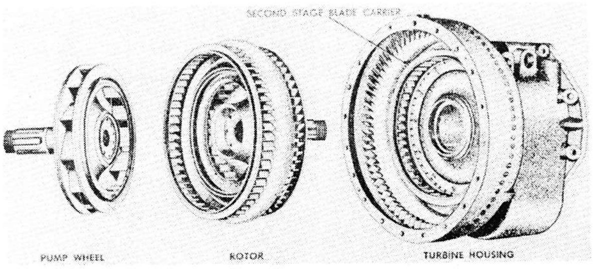


Fig 6 - Exploded view of multiple stage converter

One is to start out with blades of high curvature and then decrease the degree of curvature as the turbine picks up speed. The other is to combine the converter with a reduction gear to give the necessary torque multiplication and extended operating range required.

At first glance the former solution may sound impossible but it has been successfully achieved by GM in the Buick Dynaflow and the Chevrolet Powerglide automatic transmissions. In these the range of the converter is extended by splitting the reaction blading into two sections, each mounted on an overrunning clutch. At low speed ratios the combined curvature of both sets of reaction blading produces high torque multi-

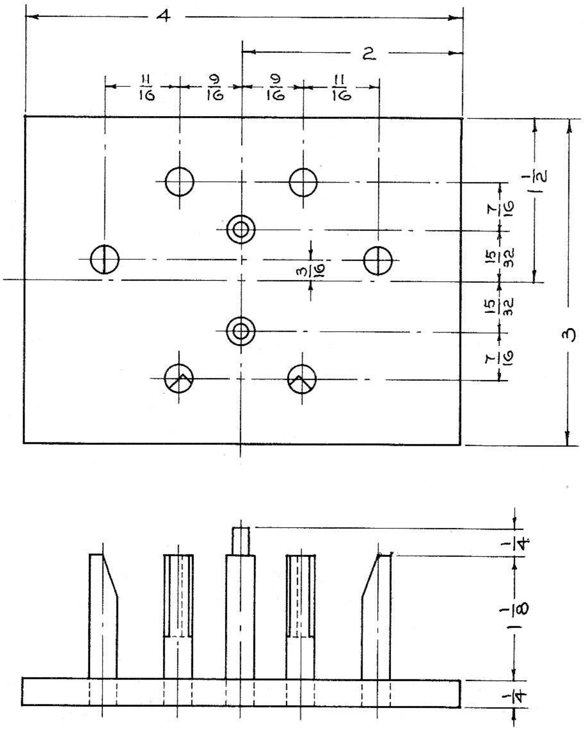
(Please turn to page 27)

SUGGEST

Contributed by 206 Wksp Malton

A very handy jig for holding binocular prism clusters while working on them — out of the binoculars — can be made up with a minimum of material and time. It consists simply of a piece of flat 1/4 inch stock and eight short pegs 1/4 inch in diameter, as per diagram.

This jig will soon repay itself for time spent in manufacture, by time and temper saved in its everyday use.



This leak tester was designed and made at 206 Workshop RCEME by Messrs Darnley and Goer, both of whom were employed in the body repair shop.

The unit consisted of a tank to hold water and a tray which can be mechanically lowered into the tank. A suspected leaky radiator has all the main holes plugged (airtight) and a constant air pressure of 5 psi is maintained inside the radiator from an air compressor. The radiator is then placed on the rack and the rack lowered into the tank until the leak is located from the resultant stream of air bubbles in the water.

The unit is not large; has very few moving parts and is easily maintained; is very effective in locating even the smallest leak; and is just another example of how the ingenuity of army personnel has made a difficult job easier.

A portable vacuum cleaner, a length of 1/2 inch rubber hose, a small air gun and a few fittings make a jig which is invaluable in any instrument shop.

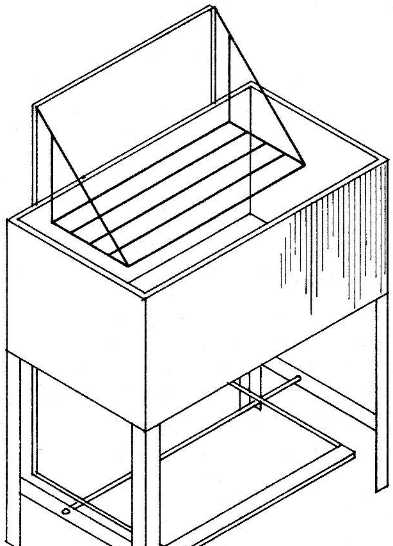
First of all, braze the 1/2 inch copper tubing to the end of the vacuum cleaner hose. Braze 'T' joints on the copper tubing bench lengths apart. With fittings attach a length of 1/2 inch rubber hose to these 'T' joints. On the end of each length of rubber hose attach the air guns. To add to the efficiency of this jig a system of electric switches should be arranged so the vacuum cleaner may be started or stopped from each bench.

The vacuum cleaner should be available through Ordnance and the copper tubing, rubber hose, and air guns should be procured locally.

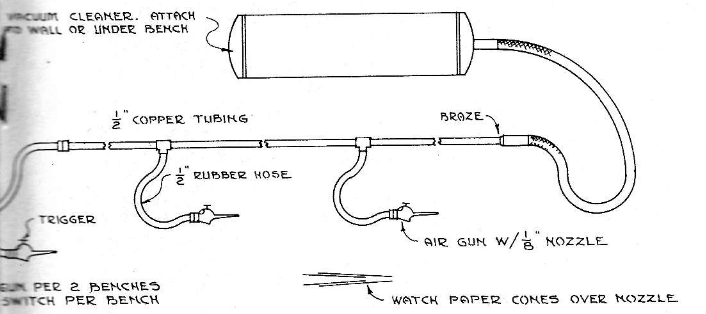
This jig will be found most useful for cleaning graticules and the suction may also be employed for lifting lenses and graticules in and out of tubes.

If the vacuum cleaner is required for other uses a fitting may be employed between the vacuum cleaner hose and the copper tubing.

Contributed by 206 Wksp Malton



TION BOX



Contributed by 210 Wksp Picton

On the wall of the electrical and battery shop which adjoins the MT section, and recessed between the 2x4 uprights is a coil of heavy two-line wire. One end of this coil passes through a ventilating slot into the battery charging room. The coil is long enough that being uncoiled, the other end extends into the vehicle bays. Both ends of the coil are fitted with spring clips.

This enables a battery requiring a small amount of recharging to be recharged in the vehicle, as for instance, an overnight charge. It is particularly useful in the case of 12 V batteries in vehicles which are to be ready for delivery the next day, but the batteries of which are slightly less than fully charged.

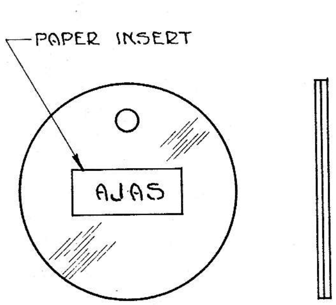
The tool check situation at 224 Workshop RCEME, Edmonton, had reached an impasse. Tool checks were not available from Ordnance and those procured locally with numbers on had proven to be easily duplicated.

The idea was developed of writing the man's name on a slip of paper and placing it between two pieces of celluloid one and a half inches in diameter. The two pieces were then glued with acetone and a hole drilled in the top. To ensure there is no duplication the OIC initials each slip of paper on the back.

To produce enough of these tool checks a piece of flexible saw was rounded into a circle, welded to a holder and put into a drill press. In no time at all a hundred and fifty tool checks had been cut out of a sheet of celluloid (talc).

Six of these tool checks are carried by all personnel using the tool room. When a tool is required the man simply hands in one of his tool checks which is placed on the appropriate nail on the shadow board and tool is his.

Capt Tom Palfrey thought the idea was so good that he scrounged enough celluloid from 224 Workshop to inaugurate this system in his workshop at Fort Nelson.



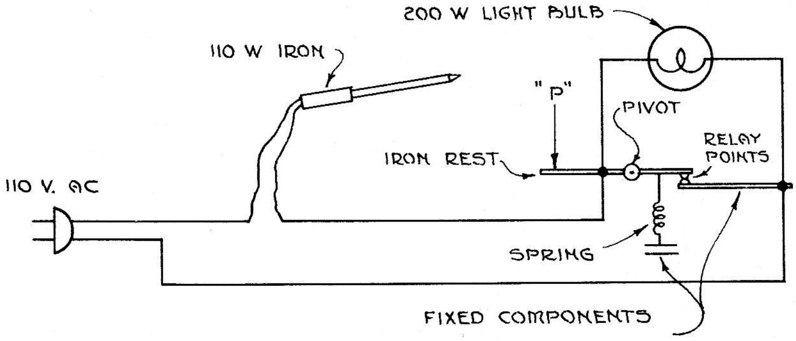
The purpose of this gadget is to ensure that a soldering iron is hot and ready for use at a moment's notice without being overheated.

When the iron is not in use it is placed on its rest. This action causes force 'P' to act and opens the relay contacts thereby placing the 200 Watt light bulb in series with the 100 Watt iron. This allows enough current to pass through the circuit to keep the iron hot, but it will NOT overheat.

When the iron is being used it is removed from the rest and by the force of the spring, the relay contacts are closed, thereby shorting out the light bulb.

The equipment necessary to build this unit is cheap and easily obtainable. Components required are: 100 Watt soldering iron; 200 Watt light bulb; socket to hold light; and old relay points and spring. The unit is rugged and very effective and can easily be made portable.

Below is a schematic of unit.



Front row (l to r) L/Cpl W C Brown, L/Cpl W Williams, L/Cpl R G Noble, Sgt W E Henden, Lt W J A Groom, Sgt A D Collingwood, Cfn C L Johnston, Cpl L R Mott, Cpl D A Pratt.
Second row (l to r) L/Cpl D W Purdy, L/Cpl M T C Watson, L/Cpl E J Gross, L/Cpl J T Laing, L/Cpl K F Haughton, L/Cpl C H Yorke, Cfn F C Potter, L/Cpl W A Best.
Third row (l to r) L/Cpl J M Lupasko, Cfn H E S Tarves Cpl M P Durham, L/Cpl A J Roy, Cpl I J Smith, Cfn E E Hardie, L/Cpl J M Lee, Cfn R T E Jamieson.
Fourth row (l to r) Cpl E L Swan, Cfn R K Watson, Cfn C L Thompson, L/Cpl G G Birdsell, L/Cpl R E Hennessey, Cfn J E Kidd, Cpl J F Bryan.

THE JUNIOR NCO

Did you know that we now are conducting courses within the Corps to qualify non-commissioned officers? Such a course was completed on 10 Mar 51 when one of the finest classes ever to pass through the RCEME School qualified as junior NCOs.

Every RCEME unit in Canada was represented by the personnel on the course. Will any member forget 'Eyes' Birdsell, 'Smilie' Best, 'Stove-pipe' Potter, or any of the other nicknames that were acquired?

Potential NCOs on this type of course receive valuable training in such subjects as Technique of Instruction, Primary Management Training, Corps Training, Roles and Methods of Operation in Canada, and in the field duties of NCOs besides a refresher in basic training. While the course teaches the student a great deal of new material, the primary object is to develop his leadership, self-confidence, and powers of command.

The excellent results achieved by this course was due largely to the fact that every member of the course started with the idea that the training he was to receive would be valuable to him and to the Corps, and that it was worth doing well. With this attitude, the whole course worked as a team with the instructors and coaches. Every man carried his full share of the load.

The congratulations of the Corps are due the members of Junior NCO Course EME 0/246 for a job well done. The knowledge and training acquired by these men will stand them in good stead as they advance in their careers.

AUTOMATIC TRANSMISSIONS continued from page 23.

plication.

As the speed of the turbine begins to approach impeller speed the steeply curved section freewheels and only the section with limited curvature remains effective. At about the same time the pump capacity automatically increases, it also being built in two sections, and the effective range of the converter is thus extended. At still higher speed ratios the remaining reaction section also starts to freewheel and the converter becomes a fluid coupling. Thus by the use of a somewhat complex blading design, this single stage converter is made to produce sufficiently high torque and wide enough range of operation so that over the whole normal driving range no shifts are required, doing away with the necessity of additional gearing with its accompanying intricate system of automatic controls.

The last solution is the one adopted by Ford-Mercury and Studebaker in their automatic transmissions. In both of these a three element single stage converter is combined with a planetary reduction gear set located behind the converter. At low speeds torque multiplication consists of the sum of converter multiplication plus gear multiplication.

Then, as the output shaft to input shaft speed ratio increases, converter multiplication ceases, the unit becomes a fluid coupling and all further torque multiplication is supplied by the gear set alone.

Beyond this point the Ford-Mercury transmission differs from the Studebaker. In the latter system as soon as the torque multiplication provided by the gear set is no longer required the transmission output shaft is automatically locked to the engine flywheel by means of a clutch and all further operation is in direct drive. In the Ford system only the planetary gear set is locked and all operation in direct drive is done through the fluid coupling. Ford designers placed high value on the smoothness inherent in maintaining hydraulic drive at all times and were willing to sacrifice economy due to slip to obtain this smoothness, while Studebaker designers placed high value on economy and were willing to sacrifice some smoothness to obtain it. In both transmissions the shift into high is made by automatic governor controls whose action depends on the degree of throttle opening, and an overrule is provided by means of which an emergency shift back from direct into reduction can be made by exerting an extra pressure on the accelerater. On both these converters the simplest design of blading is used but with the addition of a complicated governor controlled gearshift with overrule to meet the performance required.

Examining the various designs which have been reviewed, we find that simplification in one part is compensated for by complication in another, the actual construction chosen being influenced by the relative importance placed on various requirements. For example, at one end of the scale we have the Hydramatic where the torque multiplication is provided entirely by gearing in four separate steps, requiring clutches and a complicated automatic control mechanism. At the other end of the scale we have the Powerglide and Dynaflow with torque multiplication for the driving range produced entirely hydraulically without requiring any automatic shifting and governor controls. But the cost for this is a more complicated blading system. The remaining drives come somewhere between these two extremes.

It would appear that automatic transmissions are best suited for vehicles which operate under conditions requiring frequent gear changing. This is because the human element is removed and the engine is allowed to operate constantly in the proper speed range -- also the driver will have much less to do, giving him more time to play canasta with his co-pilot.

The biggest drawbacks are cost: an automatic transmission costing anywhere from three to ten times as much as a conventional one required for the same job — and complicated construction, which results in increased maintenance problems. In addition, automatic transmissions employing torque converters result in higher fuel bills throughout the car's life. Here's why.

Converter efficiency is at best only about 80 to 85% with the pump running twice as fast as the turbine, at low speeds. In normal highway driving when the converter acts as a fluid coupling this efficiency is, of course, increased some what. Obviously this results in higher fuel consumption in city driving, and even on the highway the automatic transmission gives less miles per gallon than the geared type. Estimates of this loss vary from one to two miles per gallon depending on the type of driving.

Some of the disadvantages of the torque converter have been overcome by employing the split-torque principle where the converter transmits part of the engine torque and the rest is trans mitted through a direct drive. The two torques being combined in a planetary gear set before acting on the output shaft. The internal gear of the planetary set is driven by the converter, the sun gear is driven by the engine through a direct mechanical hook-up, and the torque to the output shaft is transmitted by the planet gears in between. This principle is employed in the Cross-Drive transmission which has proved more or less successful in American combat vehicles.

In conclusion, there seems to be no doubt automatic transmissions are making the lot of the lazy driver much easier, but he must pay for it!

Figs 7 to 11 represent diagrammatically some of the automatic transmissions employing torque converters. In these diagrams "A" represents the pump, "B" the turbine, and "C" the reaction blades.

Torque converter transmission of the type used in buses. High starting torque produced entirely by the converter with no additional gearing (except reverse) being required. Direct drive is automatically engaged at higher vehicle speeds by disengaging the clutch which drives the converter pump, and engaging the clutch which couples the flywheel directly to the output shaft. Similar transmissions, without the clutches but with an auxiliary gear train mounted behind the converter, will be found on some tractors and tanks.

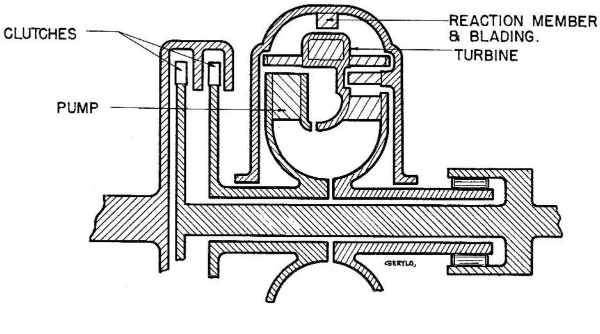


Fig 7

Packard Ultramatic transmission. Starting torque in driving range produced entirely by the two stage converter which functions as a fluid coupling in the higher speed ratios. To eliminate coupling slip direct drive is picked up automatically at higher vehicle speeds by engaging the clutch which locks the pump and turbine together. The shift into direct is made by a governor-regulated mechanism whose action is modified by throttle opening — so that shifts are made at varying vehicle speeds as required. An overrule is provided by means of which direct drive can be disengaged whenever maximum acceleration is required by depressing the accelerator all the way down. The planetary gear set is manually selected and is used only to provide reverse and an extra low gear when required.

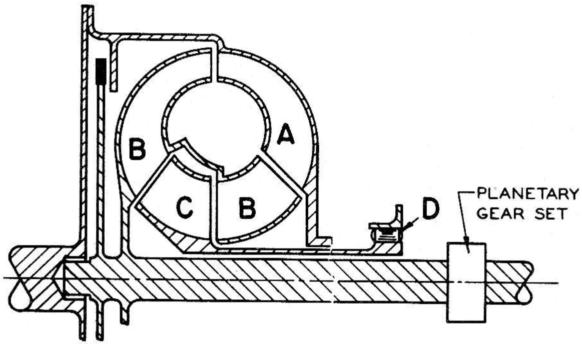


Fig 8

Buick Dynaflow and Chevrolet Power Glide transmission. Starting torque provided entirely by the 5 member single stage converter which functions as a fluid coupling at higher vehicle speeds. The planetary gear set is manually selected and is only used to provide reverse and low gear when required.

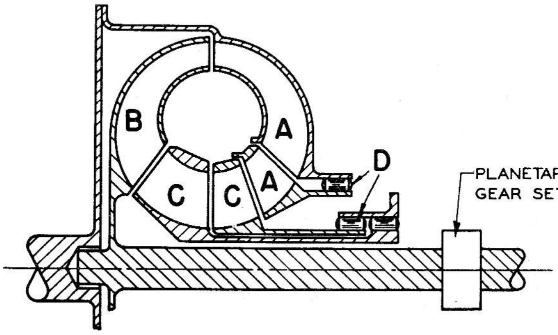


Fig 9

Studebaker automatic transmission. Starting torque provided by a three member single stage torque converter operating in conjunction with a planetary reduction gear -- the converter acting as a fluid coupling in the higher speed ratios. All high speed driving is done in direct drive picked up by coupling the output shaft to the engine flywheel through a clutch which is automatically engaged by a governor-controlled mechanism whose action is modified by throttle position. An overrule is provided by means of which a shift from direct into reduction can be made by depressing the accelerator all the way down. The second planetary gear set provides reverse and an extra low gear which can be manually selected when required. Included is an anti-creep arrangement which automatically sets the brakes when the vehicle is stopped.

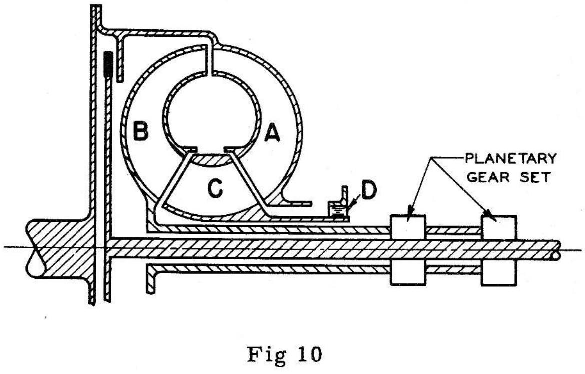


Fig 10

Ford-Mercury automatic transmission. As in the Studebaker design a three member single stage converter combined with planetary reduction gears is used. No direct drive clutch is provided however -- the drive at all times being taken through the converter which acts as a fluid coupling in the higher speed ratios. The planetary reduction gear set is automatically shifted into high by a governor-regulated mechanism with action modified by throttle position. Low range and reverse can be manually selected when needed. Instead of having two planetary gear sets as shown, a double pinion type of gear set provides either of the two forward ratios or reverse gear by means of suitable clutches.

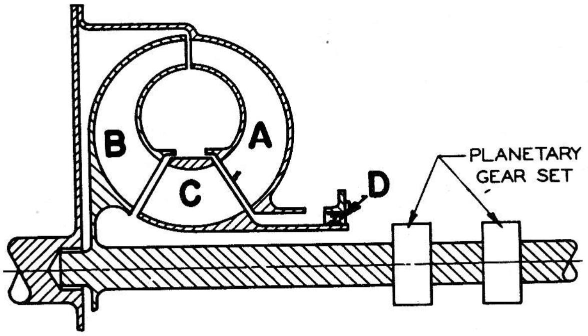


Fig 11 (See also outside back cover)

CANADA'S GIFT TO EPSOM

ROSEBERY PARK CEREMONY

Memories of the Canadian Army's association with Epsom were revived at a pleasant ceremony in Rosebery Park last week when Col G.W. Beecroft, who commanded a unit of Dominion troops stationed in the town presented eight park seats to the borough.

The seats, a gift from the Officers of No 2 Army Field Workshop, RCOC, were accepted by the Mayor on behalf of the town.

Recalling that his old unit came to Epsom in July, 1940, Col Beecroft said, "They were happy days, but also eventful and grim because invasion was expected at any moment and we were all ill-prepared for what might come".

He spoke with gratitude of the Canadians' many friends - WVS and their mobile canteen, Major Norman Eggar, the late vicar Canon H.C. Warner, and Miss Froude (Mrs Price) and other voluntary workers at the "In and Out" Club in the High Street.

At the end of 1941 the unit was broken up to become the nucleus of two other units.

Col Beecroft, who was a convalescent soldier at Woodcote Park in 1917, said that after an absence of 23 years he remembered little of Epsom save the Clock Tower and the High Street.

"I am happy to present these benches as a small token of the appreciation of the wonderful hospitality that was shown to our people during their stay here," he added.

After the British and Canadian flags had been drawn from across one of the seats the Mayor, Ald G.C.A. Mann, thanked Col Beecroft and his fellow Canadians for their gift and expressed the hope that the world would return to the peaceful atmosphere symbolized by the present ceremony.

Among the company present were Major J.S.P. Armstrong, Agent General of Ontario, Mr W.A. McAdam, Agent-General for British Columbia, Mr George Taylor, of Ontario House, and a number of persons who were associated with the Canadians.

- The Epsom and Ewell Herald.

Contributed by Col G.W. Beecroft
Supplementary Reserve (RCEME)

Col Beecroft (right) sitting on one of the benches, talking to Mr E Menard ex-private in the 2 AWF and his daughter who live in the town. Partly visible, below the 'RCOC' is the brass plate made in the RCEME School, Barriefield.

CORPS BIRTHDAY

At 202 Base Workshop
Montreal

At 1800 hrs on the 11th May personnel of 202 Base Workshop from A/CO to Cfn gathered in 'B' Mess of 25 COD to celebrate the 7th Anniversary of our Corps.

The dinner started approximately on schedule after liquid refreshments had been served, with the guests of honour being Major L. A. Bourbonnais, A/CO; Lt Col Gernaey, representing 25 COD; and Major Serre representing the RCOC School. Turkey with all the trimmings, birthday cake and jelly, prepared by WOI Thomas, Sgt Nichol and the cooks of the men's mess, was something to remember. The cake consisted of seven layers surmounted by the new RCEME crest and was just as delicious as it looked.

After dinner the guests of honour, in short witty speeches, stressed the happy relations existing between Ordnance and 'Reemy'. The chairman then passed on a hearty vote of thanks to all who had helped in making the dinner such a success. The gathering next adjourned to the lounge, where the bar had been opened and entertainment was being provided.

To start the entertainment Cpl Daigneault had managed to bring down an excellent instrumental quartet, who were very good.

The Longue Pointe Glee Club under S/Sgt Dobson then gave a few harmonized numbers, and Cfn Bruyere mystified the audience with several magic feats. Mr Bernard of Ordnance followed with a few well received songs, interspersed with humonous stories. Cfn Boxall finished the show with a little skit and the evening was declared wide open.

It wasn't long before Major Screaton was leading a sing-song at the piano, while a few other boys entertained the crowd playing guitars and mouth organs. Many of the craftsmen took full advantage of the opportunity of rubbing shoulders with their officers to get their pet peeves off their chests, but at the same time there is little doubt that unity and co-operation between officers and men was increased by the evening's festivities.

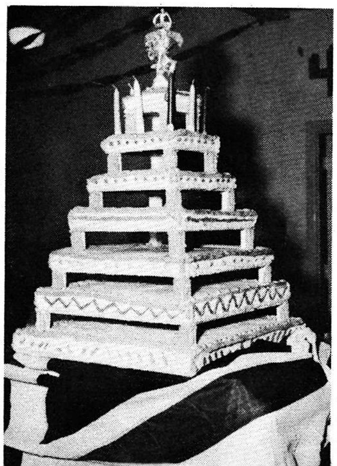
The committee, consisting of Capt Yarymowich, WOs I Forrester and Sloan, Cpl Waldron, Cfn Callagham and Walberg deserve a great deal of credit for the success of the party.

It is hoped it will become an annual affair.

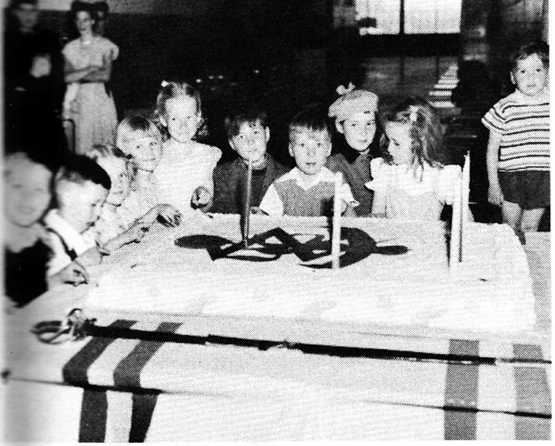
(Although the 15th of May is officially recognized as the Corps' birthday, it was decided to hold the party on the evening of the 11th so as to allow personnel of the unit to attend the Shriner's Circus on Armed Services' Night (May 15) and help the cause of crippled children).

The head table.....

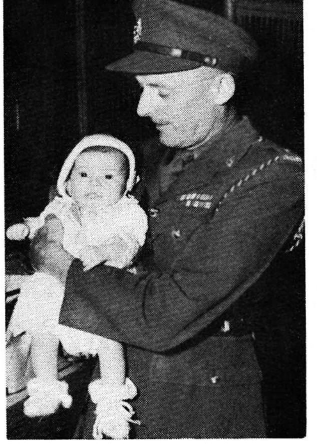
the cake.....



and the rest.



Young Camp Borden citizens preview the cake.



Major Whittingham with Patricia Jean, daughter of Cpl Paysons, youngest at the party.

First piece of cake to Dennis, son of Cpl Owen Williams; assisting is Mrs Leona McPhail.

At 205 Base Workshop
Camp Borden

By MAJOR J. W. WHITTINGHAM RCEME

(DPR Army photos)

On Tuesday, 15 May, 205 Base Workshop celebrated the 7th anniversary of the Corps with an Open House. From 1300 to 1600 hrs the workshop was visited by some 500 people. Some of these were dependants who came to see where their husbands and fathers worked, and others who were just interested parties including Lt Col and Mrs Mason (Comd EME) and Major and Mrs Kay (Western Ontario Area EME).

Several demonstrations were set up such as a 'visual-cast' at the entrance where visitors were asked for their autographs which were then projected on a screen for them. The telecomm section had several good demonstrations also; they had microphones attached to oscilloscopes, tape recorders etc, and visitors not only saw their names projected but saw them electronically on the 'scope' and heard them played back to them. Testing of the hearing range from zero to 15, 000 cycles per second was another popular demonstration. (The average person should hear from 50 to 13, 000).

The machine shop showed the public metal spraying, grinding, and general machining whilst the tank and vehicle shops created considerable interest with their normal projects of repairs. A highlight of the vehicle section was the testing of three GM Twin Diesel engines on the dynamometers. The spare parts section under the guidance of Capt Stan Hulme was a picture to behold in its spotlessness and neatness. All vehicles, shop equipments, cranes, forklifts, trucks etc, were lined up for inspection in front of the workshop while the shop itself was a very close second to the parts section for neatness and cleanliness.

A large cake, 1400 sq inches in size, decorated in RCEME colors, bearing the Corps crest and with seven candles, was produced by the RCASC catering wing by courtesy of Lt Col J.L. Lapoint. At approximately 1500 hrs our distinguished visitors arrived, Maj Gen H. D. Graham, CBE, DSO, ED, and Col R.C. Clark, DSO, CD. After fighting their way through some thousands of children (it seemed like thousands, at least), Maj Gen Graham received the cutting sword from Col Clark and proceeded to cut the lovely cake.

Public Relations was there in the person of Capt Alec Dare, and amid the screams of children and the flashing of bulbs the GOC and our Camp Commander managed to give out several large pieces of cake to the eager youngsters. Coffee, cake and ice cream were then passed while Maj Gen Graham and Col Clark made a tour of the workshop.

In the evening parties in the various messes were the order and, as is the custom at RCEME parties, were a howling success.

* * * *

The CO the RCEME School decided to curtail his elaborate plans for the celebration of the Corps' 7th Anniversary because of committments for training the newly organized 27th Brigade. However, the usual All-Ranks' Dance was held, where the huge birthday cake was cut, and suitable ceremonies were held in the various messes and canteens.

A Conference is a gathering of important people who singly can do nothing, but together can decide that nothing can be done.

—Fred Allen

Eastern Ontario Area

LMG Competition

The RCEME Corps, and the School in particular, have once again upheld their reputation as soldiers and marksmen. On 6 May 51 at Barriefield Range with a field of 22 teams from 8 units of the Active and Reserve Force of Eastern Ontario Area, the area LMG Competition was held. Those represented and number of teams each were:

RCEME School	5	60 LAA Bty RCA	2
1 Bn RCR	5	PWOR	3
RCS of Sigs	1	Hast & PER	3
127 HAA Bty RCA	1	PLDG	2

The match consisted of fire and movement with three-man teams firing at 400, 300 and 200 yds, one team member firing one mag at each range. Teams were allowed 70 seconds in which to run 100 yds and fire one mag, and 30 seconds to service the gun, adjust sights etc, before running the next 100 yds and firing the next mag.

When the results were in, the RCEME School teams had captured 1st, 2nd, 3rd and 5th places. The 1st place team was composed of WOsI Etter and O'Connor and Sgt Monkman who scored 110. The 2nd place team scored 105 and was composed of Capt Fendick, S/Sgt Cooper and Cpl Beatty. These two teams together won the unit prize for the best two teams. This also gives the RCEME School the honour of representing Eastern Ontario in the Provincial LMG Competition to be held at Long Branch in June.

The third School team of Cfn Foster, Drexel and Morrissette was 3rd with a score of 97. This beat out the best score made by any other unit — the 92 scored by 1 Bn RCRs. The three craftsmen on this team are all young soldiers either still in, or just finished, basic training, (which speaks well for this training at the RCEME School). These young soldiers deserve a lot of credit for their fine showing.

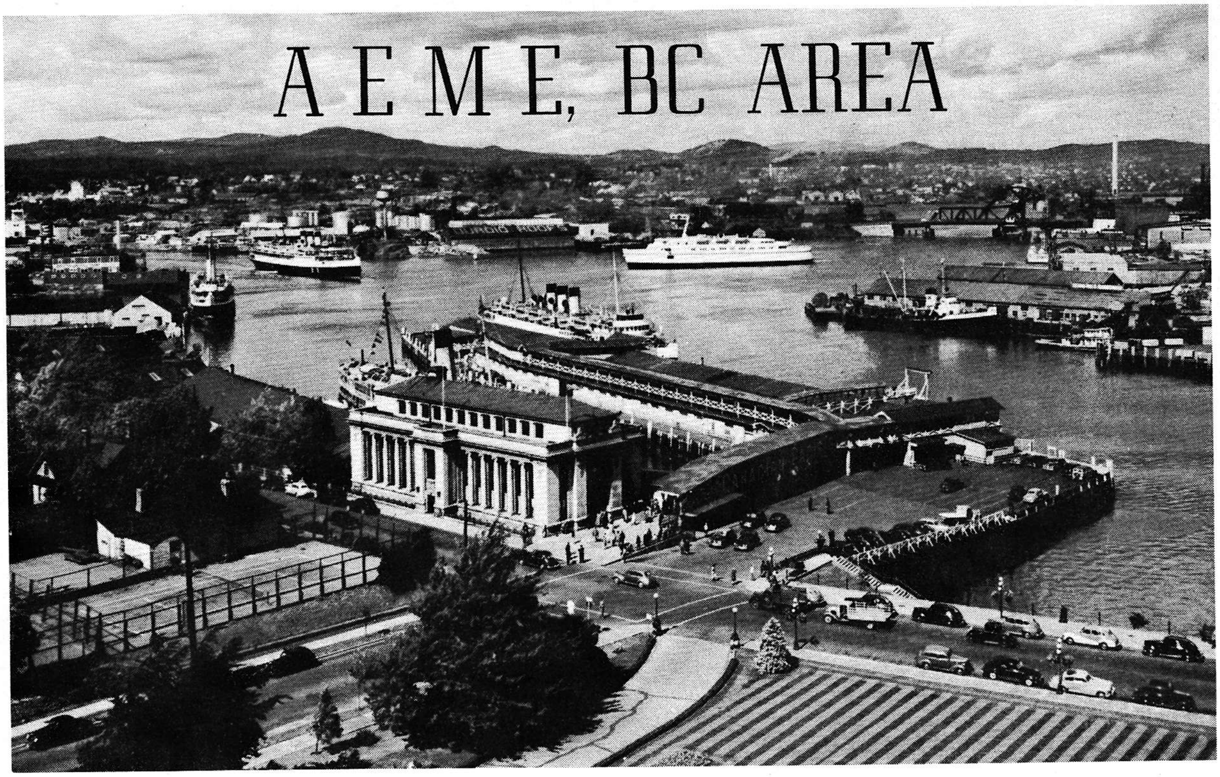
The 5th place team was composed of Capt Pinder-Moss, Cpl Wilson and Cfn Buckler, and turned in a very creditable score of 87.

The last RCEME team did not place so well, but this is not too surprising, since they only had one brief practice with a gun which they had no opportunity to zero. This team represented the COTC at the School and consisted of Officer Cadets Murray, Graham and Preville. They had been at the School only for a few days and since they last saw a LMG one year ago, they also deserve a lot of credit for their enthusiasm in turning out at all.

It is hoped that the foregoing account will serve to show other units of the Corps that RCEME can and does compete against other Corps as soldiers as well as tradesmen, and further that military training can be turned to sport and recreation as well, with excellent returns for all concerned.

Front row (l to r) WO I O'Connor, Cpl Beatty, WO I Etter, Capt Pinder-Moss, Capt Fendick. Middle row (l to r) O/Cs Graham, Murray, and Preville; Cfn Morrisette, Cfn Buckler, Sgt Monkman.
Back row (l to r) S/Sgt Cooper, Cfn Fostey, Cpl Wilson, Cfn Drexel.

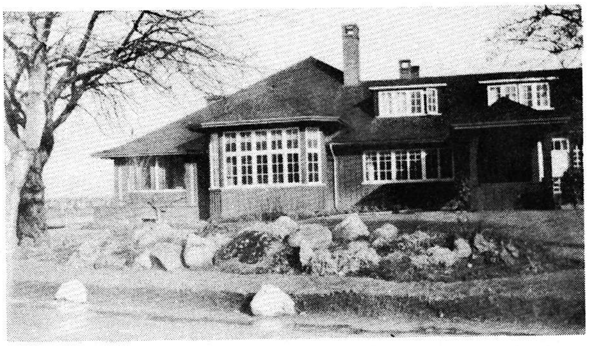
A E M E, BC AREA



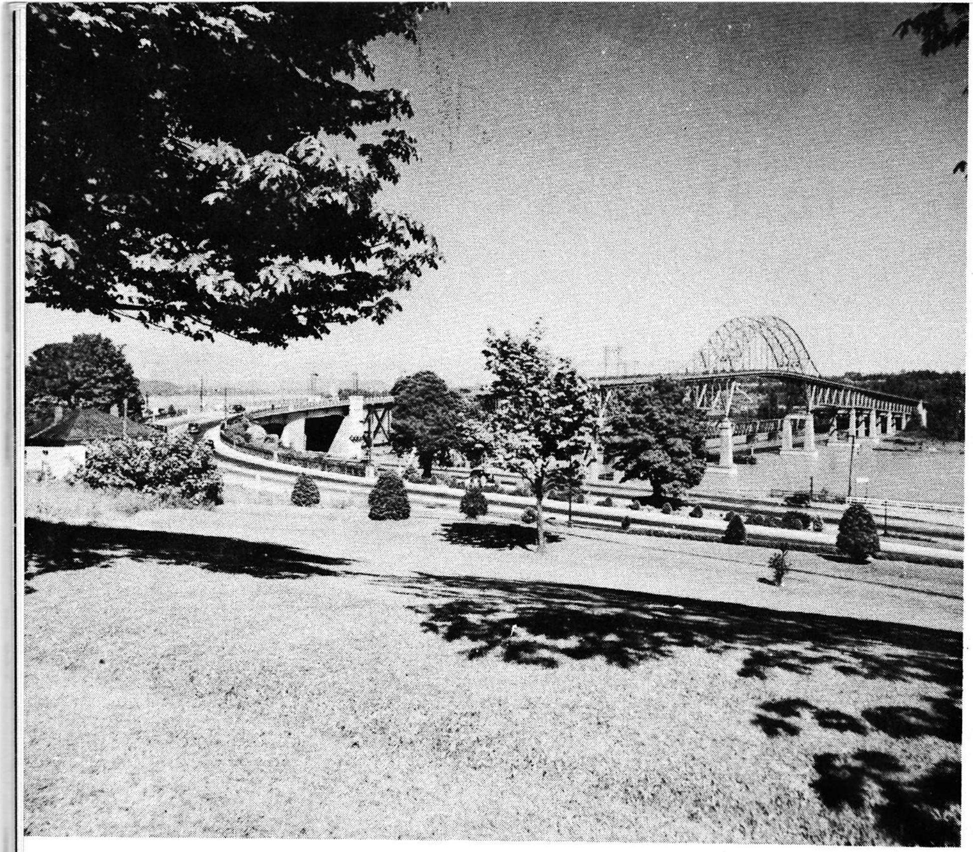
It was in December, 1947, that the DME called me into his office and introduced me to the Commander, BC Area. After a short interview I was asked if I would like to go out to British Columbia and become the Area EME. As the idea of some day going to BC had always been the subject of considerable discussion between my wife and myself, the appointment was accepted immediately. I was to proceed ahead of my family and send for them when I found suitable living accommodation in Vancouver.

It was a frigid night at the end of January when I said goodbye and embarked on the CNR Transcontinental train in Ottawa, full of enthusiasm and armed with ample reading material in the form of DME Departmental Instructions, CAEME Instructions General and various pamphlets describing Canada's Evergreen Playground. I had never been very far west before and new and interesting scenes appeared before me at every mile as we journeyed westward. The trip through the prairies, then the Rockies, down the beautiful Fraser Canyon and finally into snow-free country in the Fraser Valley is still fresh in my mind. The first impression which I got when I walked out of the Vancouver railroad station is hard to describe. We had passed through a natural barrier of thrilling mountain country into a soft, warm summer climate. A few days ago in Ottawa the temperature was 31 degrees below zero, now it was 55 or more degrees above. The officer who had been detailed to meet me is an ardent Vancouverite and drove me out to HQ via the famous Stanley Park route: in a matter of a few minutes I, too, was completely sold on Vancouver. We passed the imposing Lions Gate Bridge, saw totem poles and lovely English Bay.

We arrived at the Joint Services mess just before lunch and I marvelled at the green lawns, spring flowers, the sea and its wonderful mountain background. Those who knew the old Jericho Officers' Mess will agree that a more charming and pleasant place at which to be quartered would be hard to find. The mess stood well back from the road and the glassed-in veranda looked out over English Bay. Seagulls were hovering



Jericho Beach Officers' Mess



overhead and stately steamers moved through the channel, ocean freighters from the Orient plying their way to the sheltered harbour of Vancouver.

Life was pleasant for the next few weeks and as I made new friends and got to know more of this province my enthusiasm gained more and more momentum. The Vancouver Workshop is located at Jericho at the former RCAF seaplane base. You look out of the workshop windows onto the Bay not more than 150 yards away. During break periods and lunch hour the boys who owned boats had time to check their moorings and pump bilges.

The weather turned wet and cold during early March and some snow fell. On the evening of 16 March I attended a meeting of the EIC in Vancouver and returned to the mess about 2230 hours. A few of the Pay Corps boys were playing billiards and I retired to my room about 2330. The warmth indoors made me sleepy and I soon fell asleep. Shortly after midnight I awoke to find myself coughing and choking in an atmosphere filled with acrid smoke. There were no sounds except a low roar. I felt the inside of my room door and it was still cool so I opened it and found the hall and stairway choked with smoke, and I could see the reflection of flames below. I shouted 'Fire! Fire!', but no one seemed to be around; every second the flames and crackling increased. My voice was drowned out by the rising inferno so I rushed back into my room and threw open a window and continued shouting 'Fire!'. Soon my shouts were heard and those who came under my window called to me to jump as the whole lower floor was in flames. Gathering up a handful of clothes I bailed out and landed in a very undignified position below, somewhat shaken but thankful to be there. The fire engines arrived very soon but no amount of water could stop the progress of the flames and the whole building was a ruin in less than thirty minutes. My kit, baggage and everything else was a total loss. Kind friends took me in and helped me to refit, which, needless to say, was an expensive job. Boys, make sure that your fire insurance is in order when you move around.

My first trip to Vernon was in April, 1948, and I was indeed fortunate to have old 'Gibby' as my companion and driver. This old chap knew BC in the greatest detail and kept you en-

Left to right:

Pattullo Bridge, New Westminster

Lion's Gate Bridge, Vancouver

Vancouver

tertained always with interesting conversation as you drove along. Those who knew Gibby for his fatherly interest in them were very grieved at his death.

I have seen the salmon going through the fish ladder at Hell's Gate in the Canyon and the tumble weed blowing along the 'interior' roads ..... these are some of the things that you never forget.

The administration of RCEME Services in British Columbia is perhaps difficult to understand unless one has a good knowledge of the geography of the Province. Distances are great and Reserve Force units are scattered over wide areas. We have a minor base workshop in Vancouver with 2nd echelon shops at Chilliwack, Vernon and Esquimalt. One can drive from Vancouver to Chilliwack over a good highway in a matter of 2 1/2 to 3 hours, but Vernon is 350 miles from Vancouver and the road follows the Fraser Canyon. This drive is extremely scenic, but hazardous. In places the road actually overhangs the steep canyon slopes. To visit our Esquimalt workshop one has to travel by air or boat. The boat trip is very pleasant and takes about five hours. A detachment was found necessary at Prince Rupert, BC, which is some 550 miles up the Coast.

In May, 1948, the floods caused by the raging Fraser River created severe havoc. The Province requested aid from the armed forces. This became a major operation and involved the use of amphibious vehicles, searchlights, generators, engineer equipment and all available manpower. The men who took part did a marvellous job; they worked hard, never complained and practically forgot about sleep and recreation. I well remember visiting Matsqui one morning and seeing all the personnel of 214 Base Workshop laid out and sleeping peacefully in an old community hall after being relieved after a 24 hour vigil on the dykes. Six hours later this dyke was swept away by the flood and the unit which had relieved us had a very wet exodus. We all learned a lot and I think are now better equipped to assist in any future emergencies.

The men who carry out RCEME inspection duties in BC travel thousands of miles each year. For instance, a trip from Vancouver to Kimberly, BC, takes one through the States of Washington and Idaho and the mileage runs in the neighborhood of 2100 miles.

The Area EME in this area is also Officer Commanding 11 Coy RCEME and is responsible for the efficient functioning of four workshops, two small AWDs, the inspection teams, and is of course the technical adviser to the Area Commander. He is also much concerned with the activities of the RCEME Reserve Force. He usually visits all RCEME Active Force units at least once a month, the RCEME Reserve Force three or four times a year, and all other Re-

(Please turn to page 46)

CROSS COUNTRY T

The photographs illustrating this article are recent ones taken in Korea by Canadian Army photographers.

Cross-Country' is a term which is generally used to signify travel over land which has not been prepared in any way to ease the passage of the animal or vehicle concerned. It is applied to a few types of vehicles but unfortunately, these are very limited in their cross-country performance. For thousands of years, man's efforts have nearly all been directed toward ways and means of building and improving pathways of various kinds. The builders of vehicles have taken advantage of each improvement in roadways until now the normal vehicles are useless when removed from their roads. The outstanding example is, of course, the locomotive. The trend of practically all development then has been away from cross-country vehicles, and it is only in comparatively recent years that vehicles of limited cross-country performance have been produced for military, farm, or construction use.

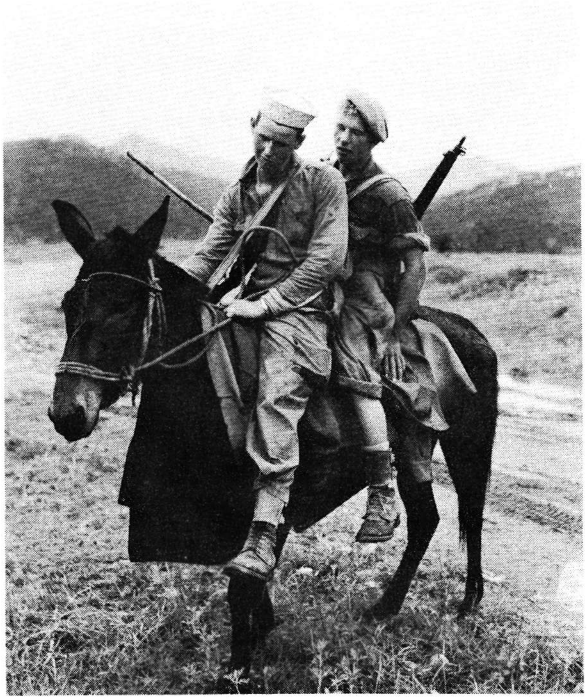
Civilization as we know it today is almost entirely dependent on transportation. No nation, city, or individual, is entirely self-sufficient and goods must be transported from place to place. A vast network has been built up gradually on land, composed of streets, roads, highways and railroads, which is so much a part of ordinary life that it is ignored until a breakdown, or traffic tie-up, brings it forcibly to our attention. It now appears that this bloodstream of the modern world is extremely vulnerable to attack by modern weapons. Since the wars of the future will be conducted with these or better weapons, it seems appropriate to look at our transportation system carefully with the thought in mind that our traffic arteries could be cut at a moment's notice with very little effort.

To get a better understanding of the problem as a whole it would be best, perhaps, to consider briefly the history of our system of land transportation. In the first instance, travel was by foot and was truly cross-country, restricted only by obstacles which could not be overcome by a man on foot. Trails gradually developed which avoided the worst obstacles and made travel easier, but confined it to the trails.

RANSPORTATION

By Lieut Col J. R. JOHNSON
Supplementary Reserve (RCEME)

The taming of various animals and their use for passenger and freight movement boosted the speed and load-carrying capacity considerably, brought improvement in trails, and more restriction to those trails. In western countries the horse became the most common transport animal.



The invention of the wheel followed and the cart was developed, first as a one-horse vehicle and later as a two-horse vehicle. Various other hitches were used but the width of our vehicle was generally kept within the two-horse limit, and roads gradually developed on this basis. Travel was then restricted almost entirely to roads, except in open country. A development of the road was the horse-drawn railway, with the gauge of track set by the dimensions of a vehicle which could be drawn by two horses.

With the invention of the steam engine the first mechanized transport became possible and, since some railway trackage already existed, the first steam-powered vehicles were built to run on the existing track. The width of the railway trains was, therefore, indirectly set by the dimensions of a horse-drawn vehicle.

Steam engines and later gasoline engines were also applied to road vehicles which were designed to suit existing roads. Since it was easier to develop smooth roads than to make vehicles which could traverse bumpy roads or open country, development followed the line of least resistance and vehicle design took advantage of each improvement in road construction. Today the average vehicle is greatly restricted when removed from a paved road, and practically useless on open unimproved ground.

The net result of practically all land transportation development has been to produce machines which are capable of functioning only on prepared paths which have become increasingly costly to construct, both in terms of time and materials. Cross-country travel has practically disappeared, except for men and animals on foot, and under ordinary circumstances the need for mechanized cross-country travel is not great enough to warrant a departure from the established means of transportation. The investment in roads, railways, equipment, vehicles and the facilities for producing them, is so staggering in amount that any thought of departing from the standard product is discouraged immediately by the normal transportation industries. Exceptions to this are the farm tractors and heavy construction machinery which have been developed for special purposes; these

". . width of the railway trains was. . . . . set by dimensions of a horse-drawn vehicle."

are capable of limited cross-country performance at low speeds, but are not transport vehicles.

The requirements for military transportation, originally not so very different from those for civilian transport, have changed greatly in the last two wars, and are changing repidly and drastically now, as a result of new weapon developments. Military vehicles must now be capable of cross-country operation, if any army is to retain its mobility. Roads, bridges, and railways are extremely vulnerable to aerial attack by aircraft or guided missiles even in the rear areas and, as we have seen, practically all forms of civilian land transport are restricted to prepared paths of this type. In a country such as Canada, with tremendous distances and relatively few transport arteries, surprisingly few hits would be required to tie up all movement of goods between the various sections of the country.

Mobility is one of the prime factors which enter into any military operation. Supply is, of course, linked with mobility and both depend almost entirely at lpresent on an adequate network of traffic arteries. The true cross-country mobility of the soldier on foot is probably the largest single factor contributing to the importance of the infantry. The present conflict in Korea would seem to contradict the argument on the importance of traffic arteries, since the UN Forces have complete air superiority and can bomb roads, etc, at will. Actually, it is the existance of vast numbers of men on foot which makes it possible for the North Koreans to continue, despite destruction of their traffic arteries.

Even without aerial opposition, the UN Forces are no doubt finding it difficult to get the volume of traffic required over the existing facilities. Equal air strength on both sides would probably aggravate these troubles tremendously and might conceivably reduce the struggle to hand-to-hand fighting, with very little mechanical equipment which relied on a long line of supply. In any such case the advantage goes definitely to the army with the largest number of men, regardless of the industrial capacity of the home countries.

A vehicle capable of true cross-country performance would appear to be the only answer for a mechanized army and for a country which depends more on its industrial capacity than on the number of men in its army. On the home front the same need exists if the industrial capacity of the country is to be insured against collapse, due to transportation failures. Canada has, in addition, a peacetime requirement for a vehicle capable of cross-country operation in those vast sections of our country which are not served by any of the normal means of transportation, except the canoe and the aeroplane.

The problems of developing vehicles capable of true cross-country travel are many and varied. Possibly the largest obstacle to be overcome is the ghost of the horse which limits the size of all our normal means of land transport. This limitation is far more serious than would appear at first sight, where cross-country vehicles are concerned.

Up to the present time, there have been very few vehicles developed which are capable of good cross-country performance; the tank even in its latest form is certainly not one of them. The American Weasel, the Landing Vehicle Tracked, and the Canadian Snowmobile with its variations, are probably the best examples of cross-country vehicles in existence, and none of these can be considered to be really satisfactory for various reasons. In all cases the vehicles are designed to be shipped by rail and to travel on existing highways. The size restriction imposed by this requirement means restriction in size of obstacle which can be overcome, since there is a definite relationship between the size of vehicle and the size of bump which can be taken at cruising speed. All previous development has been towards reducing the size of bump to suit vehicles of dimensions limited by the size of horse-drawn vehicles. Since this means prepared paths which are vulnerable to attack, let us now look at the possibilities of approaching the problem from the opposite side and increase the vehicle size to a point where the size-of-vehicle to size-of-bump ratio becomes reasonable again.

The design factors which enter into any consideration of a vehicle are as follows:-

(a) Ground pressure - ability to stay on top of the ground.
(b) Traction - ability to push itself forward.
(c) Manoeuvreability.
(d) Flotation - ability to cross rough ground smoothly.

(e) Power.
(f) Load-carrying capacity.
(g) Ground clearance.
(h) Reliability.
(i) Many others.

The above list is not complete and is not necessarily in order of importance. Considering the points listed, in detail, we find the following:-

(a) Ground pressure:
It has been fairly well established that in order to cross soft ground, and particularly muskeg, ground pressures should not exceed 2 lb/sq. in. This means the use of wide tracks for large ground contact, or very large extremely low-pressure tires.

(b) Traction:
The maximum force which can be exerted on the ground for traction is governed by the sheer strength and internal friction of the ground. Grousers or cleats are a help in soft ground but must be very carefully designed and properly spaced; they must be rugged enough to stand contact with rocks, or be retractable at will. In general, large contact areas are needed to develop traction in soft ground.

(c) Manoeuvreability:
In the case of tracked vehicles there are special conditions governing steering. It has been shown, by means of some fairly complicated calculations, that a tracked vehicle cannot possibly be steered under ordinary conditions unless the ratio of length of track on the ground to distance between center of track is less than 2. In practice it is found to be advisable to keep this ratio below 1:75. This is the point where the horse takes his first kick at the cross-country vehicles: if vehicles are ever to use existing roads, or bridges, or be transported on railways, the width must not exceed certain limits which were established originally by the horse-and-cart. Fixing the width fixes the maximum length, through the steering ratio, and this in turn limits the ground contact area. If ground pressures are limited to give good cross-country performance, then the maximum weight is also limited and the net result must be a relatively small vehicle with very little pay load.

(d) Flotation:
To be useful, a vehicle must be capable of reasonable speed over rough ground, without jarring too severely either itself or its occupants. Many ingenious suspension systems have been devised to achieve this end, but due to what might be termed 'scale effect', a smooth-riding vehicle cannot be built within the existing size limitations. For a wheeled vehicle the relationship between the size-of-bump and the size-of-wheel governs the smoothness of the ride. The larger the wheel is in relation to the size-of-bump the smoother and easier will be the ride. In a tracked vehicle with a flexible track, the controlling factor lies somewhere between the size of the bogie wheels on which the vehicle actually rides, and the portion of a large wheel which the track and suspension represents. The length of the vehicle also enters into the problem since a short vehicle will pitch violently on bumps which would not affect a long vehicle, just as a canoe pitches in a choppy sea that would not be noticed by a larger vessel. Thus it can be seen that the limitations on size imposed by existing roadways, etc, make it impossible to produce a smooth-riding vehicle for cross-country travel.

It would be amphibious

Other factors involved in design are probably equally important but do not serve so well to bring out the limitations of a small cross-country vehicle. There may be answers to the problem within existing size limitations, but so far they have not been found. Due to the physical size of the objects to be overcome, it would seem that any small increase in vehicle size would not be worth while. With this in mind, let us look at what could happen if all size limitations were removed, and consider the advantages and disadvantages of building a vehicle large enough to overcome all reasonable objections based on size limitations.

The ordinary automobile has a wheel diameter of approximately 27 inches and can contend with obstacles of up to 3 inches, even at fairly high speed, without serious effects. The ratio of wheel diameter to bump size is then $\frac{27}{3} = 9:1$. In cross-country driving the maximum unavoidable bump that might be required to be taken at cruising speed could be assumed to be 3 feet. Using the same ratio the size of wheel required would be 27 feet. This looks ridiculous at first, but let us continue. Keeping the proportions of 9:1, the width would be approximately 90 feet and the length on the ground, using tank steering ratio of 1.75:1, would be 157.5 feet. Ground clearance could be at least 6 feet. The vehicle sounds fantastic until we think of some of the large aircraft that are in use today.

In a tracked vehicle the track and suspension system form a portion of a large wheel with a soft tire. To meet the requirement of a smooth ride over 3-foot bumps the leading portion of the track should approximate the shape of a section of a large wheel, and the suspension should allow enough movement to absorb the 3-foot bump. This means that bogie wheels should have a radius of over 3 feet and the rise of the wheels should be over 3 feet as well. A rough approximation would be an 8-foot diameter wheel with a movement of 4 feet. Considering the size of landing wheels used on large aircraft, this is not too difficult to achieve. In fact tires of 10-foot diameter are now being built.

Assuming a tread width of 50 feet, the length of track on the ground would be 1.75 x 50 = 85 1/2 feet maximum. A tire 8 feet in diameter might reasonably be assumed to have a width of 30 inches. Using the staggered wheel design of the Germans, and dual wheels, this would give a possible track width of 12 1/2 feet; and an overall width of vehicle of 50 + 12 1/2 feet. Ground contact area would be 2 x 12.5 x 87.5 = 2185 sq.ft. At a ground pressure of 2 psi, this would give a total vehicle weight of 2 x 2185 x 144 = 630,000 lbs approximately -- or 315 tons.

The question of ground pressure may bear further consideration in relation to a large vehicle. In general, existing vehicles can force their way through mud up to the point where sinkage exceeds the ground clearance and the belly of the vehicle drags. In a vehicle with 6-foot ground clearance the ability to stay on top of the surface at all times may not be so important, and raising of the allowable ground pressure may be practical; this would increase the pay load tremendously. This would be particularly true in the far North where the permafrost would form a solid footing after sinkage of approximately 2 feet. Scale effect enters into the problem of sinkage and ground clearance, and it is probable that consideration has never been given to the problem in relation to a vehicle of the size proposed.

A vehicle of this size could not hope to use any existing bridges and would have to be amphibious. This is not an unsolvable problem and is not complicated by large size.

Power requirements for such a vehicle, based on a figure of 20 hp/ton, would be 315 x 20 = 6,300 hp. Modern aircraft engines could supply this without too much difficulty and possibly, in the near future, gas turbines would be available. A locomotive has been produced recently which is powered by a 4500 hp gas turbine. This would give a power to weight ratio of 14.6 hp/ton, which is quite good.

In order to retain a reasonable pay-load, the tare weight of the vehicle would have to be kept to a minimum. The techniques developed for large aircraft construction should make it possible to construct a satisfactory hull at a reasonable overall weight. To a manufacturer of vehicles, a 315-ton machine is a monstrosity and would never be given serious consideration. To a shipbuilder, the same size of vehicle is, if anything, on the small size. Aircraft manufacturers deal regularly with light-weight structures of comparable size and of a far greater complexity. Adaptions of aircraft landing gear would be within the range of size required for the suspension system.

In general, it appears that a vehicle could be built using reasonable extensions of known techniques. The cost would be high, particularly in the development stage, but in comparison to the cost of developing a new aircraft it would be not beyond reason.

Now assume that we have built a vehicle of the following general specifications:

Length overall	115	ft	Ground pressure	2	psi
Width overall	63	ft	Power	6300	hp
Ground contact	87 1/2	ft	Ground clearance	6	ft
Tread	50	ft	Crew	4	
Contact area	2185	sq.ft	Payload	40	tons
Total weight	315	tons	Performance	40	mph; bumps under 3 feet.

Hull: aircraft construction, amphibious, protective bottom and nose.
General: living quarters for crew similar to small boat; engines accessible for servicing; cargo space with hatches and winches.

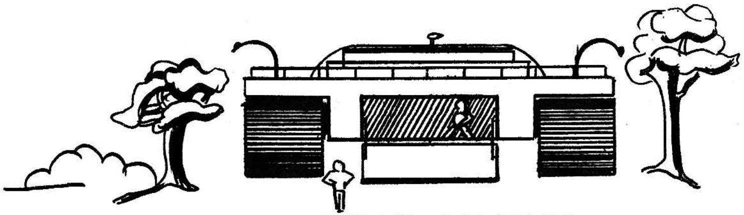
Such a vehicle could not be used in the settled portion of this country during normal times and could not even be transported through this area fully assembled, but the vast roadless expanse of Canada north of the narrow belt of civilization would be available to this vehicle all year round. The vehicle could be built anywhere on the St. Lawrence water system and either transported by ship or towed to points where access to the North could be obtained without interfering with the normal roads or damaging property. Once into this vast expanse of country, the only obstacles would be heavy timber and mountains or bad rock formations. In many cases these could be avoided by taking to the waterways.

A fleet of land ships could be built to carry freight and passengers into the areas now served only by air and canoe in summer, with the addition of tractor trains in winter. The possibilities for expansion in this area are tremendous. On the northern prairies and in the Arctic and sub-Arctic regions travel by this type of vehicle could be rapid and relatively easy due to the open nature of the country. The only area in which travel would be severely restricted, if not impossible, would be the Rocky Mountains. The vehicle has definite commercial possibilities, on a long-term basis.

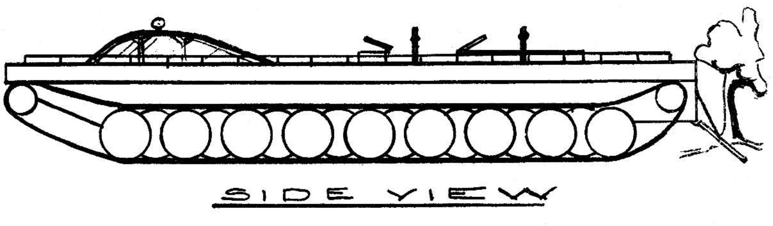
From a military standpoint there are several very attractive features. Mobility of the ground forces is restored and can be maintained under all conditions short of destruction of the vehicles themselves. Supply lines would be assured, regardless of the destruction of existing roads and bridges. During warfare considerations such as damage to farm property in settled areas would be dropped and high-speed travel would be possible across open fields. Dispersal and concentration of forces would be relatively easy and rapid. To reduce losses from aerial attack dispersal is essential, but concentrations are vital to success in any military operation; and the ability to move a force rapidly and easily under all conditions could be a deciding factor in any engagement.

Warfare in the North is at present considered to be impractical due to the large proportion of time and effort required for existence in this territory. Men and materials can be landed by air but are largely ineffective. A parallel case would be a navan engagement carried out with motor boats and swimmers 1000 miles from shore -- with no large ships in existence. With vehicles of a size capable of easy movement over the terrain, and heated living quarters from which to fight, the problem is greatly simplified. Warfare in the North or in any of the uninhabited areas of Canada would develop into a naval type of warfare with land ships. Heavy armour would not be practical except in very special vehicles, but the use of rockets and recoilless weapons would give the cross-country vehicle tremendous fire-power without great weight.

The foregoing suggests a new approach to both civilian and military transport. As a military measure any country could develop this type of vehicle, but Canada is particularly suited to the use of such vehicles for civilian purposes. From the military angle, Canada is one of the few nations which could develop, test, and train with such vehicles without disrupting the country. There is a need for such development, and the development appears to be possible by the use of existing components. What is lacking is the imagination and energy to cut loose from the horse and make a big enough jump in size to produce a vehicle which is in proper proportion to the size of the obstacles encountered in cross-country travel.



END VIEW



SIDE VIEW

COTC RCEME

With the arrival of the 1951 COTC training season. it is of interest to look over criticisms or comments made on this scheme in the past.

In case some of our readers may not be aware of the program which RCEME members of the COTC at the universities follow, this may be summarized briefly as follows.

The training program is divided into two theoretical and three practical training phases. The two theoretical phases are conducted at the universities during the academic year and consist of lectures and demonstrations on the organization, characteristics, employment, and role of the various units of the Canadian Army. This phase is common to all corps.

The first two practical phases in RCEME are conducted at the RCEME School. These include common-to-all-arms basic officer training, corps and practical technical training. The third phase which is almost all practical technical training is conducted at 205 Base Workshop RCEME, Camp Borden.

Each phase normally consists of sixteen weeks. However, for those cadets who have sufficiently long vacations, an additional four weeks of shop work may be obtained.

Practical technical training over a whole course averages approximately 36 hours per week. It includes machine tool training and metal working and, for mechanical engineering cadets, maintenance, inspection, trouble shooting and repair of automobile major and minor components, including overhaul and test of diesel engines, also armament and small arms.

Electrical engineering cadets do similar work on vehicle electrical systems, electric motors and generators, including armature winding, rectifiers, battery chargers, searchlights, electric cranes and hoists, transmitters, receivers, telephones, projectors, control gear, and radar including alignment, calibration and the use of electronic test instruments.

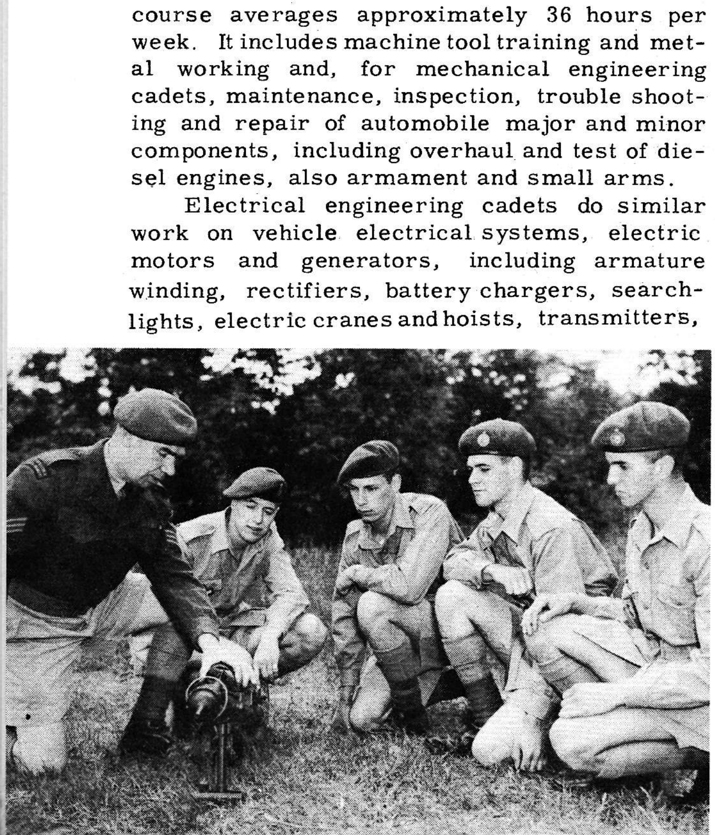
Successfully completing one theoretical and two practical phases qualifies a cadet as a 2nd Lieut, provisional upon his graduation from university. If the candidate enters the Reserve Force as a 2nd Lieut, one year's satisfactory service will qualify him as a Lieut. If he enters the Active Force, he must graduate from university or RMC or obtain a status equivalent to that of a professional engineer and he must complete successfully that portion of the COTC program or its equivalent which he had not completed prior to appointment.

At last year's EIC meeting the matter of practical training was raised during a panel discussion, with Dean C.R. Young (University of Toronto) as moderator. We quote directly from the EIC Journal (Vol 33, No 11, p 963 et seq); "Questions from the floor...... value of COTC training":-

Dr Young -- This question has been handed to me. "Are the universities satisfied with the kind of practical training COTC students get in their summer program?"

As you know there is practical training given in the technical corps of the army — the RCE ME and the RCCS. Col Boehm, Director of Mechanical Engineering, assures me what the army wants in technical officers is the same in the matter of qualifications as the good engineering student has. He wonders if the present plan is satisfactory, so far as the experience gained by army students is concerned.

Dean K.F. Tupper (Applied Science U of T) -- I have just had the privilege of visiting two of the three schools that the RCEME cadets attend in getting the training which is given to them by the army. I was greatly impressed by the quality of the training. I would not, however, regard it as an exact equivalent of an industrial training. In an industrial training the student engineer works as an equal with almost all of the men who work alongside him, and he gets a chance to understand how the working man thinks. He



Sgt Ambler (Instructor RCEME School), OCs W.C. Murray, R.J. Schramm, V.F. Elliott, D.G. Munroe.

carries a lunch pail.

The cadet, on the other hand, is in an army environment. He is in there as an officer and, although he is on a plane of equality with his brother officers, he is not so situated with the men in the ranks. I regard the training as a very good training, but not an exact equivalent.

Dean R. M. Hardy (Faculty of Engineering, U of Alberta) -- We have been accepting the training as the equivalent of industrial training in almost all cases, although I must admit that our faculty people have not been prepared to consider it as being actually equal. Our position has rather been that we wanted to co-operate with the Services to whatever extent we could, and we perhaps have been somewhat more lenient in the West than is the case in the East in accepting various types of summer training. We will consider the man who goes out as a labourer on a pole gang, for example, as getting engineering experience. I should say that in due course we shall find ourselves in the position of wanting to analyze the type of training that is given in somewhat more detail than has been done in the past, and perhaps we can make some very definite suggestions to the Services if the plan is to be continued indefinitely.

Dean E. O. Turner (Faculty of Engineering, U of New Brunswick) -- I would only add that I do think the Service training is valuable in giving something to the student in developing his leadership. As was said before, leadership is a question of native ability, rather than developed ability. On the other hand, I think these men who have had the Service training do come back to us after a summer with possibly a little better developed leadership than they might have had before. Possibly what they do not get in rubbing elbows with the common man, they may get to a certain extent in leadership."

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Our own view is that Dean Turner's remarks bring out the difference in each type of training. The COTC training stresses leadership and the development of a sense of responsibility toward one's work. Although industrial experience provides the university undergraduate a close contact with labour, the work is not likely to provide him with an opportunity of leading nor of assuming responsibility, either for the work he is doing or the men he is working with, nor is it likely to combat the eight-to-five complex so prevalent in all classes today. We must remember that in Canada most undergraduates have carried dinner pails or have relatives and friends carrying dinner pails. Mostly, they are practical men who understand the common view.

The proof of the pudding is in the eating. The officers taken in as a result of this scheme will, themselves, be the proof. With the minor changes recently made in the program, it provides, we think, one of the most successful aspects of army training generally. In the meantime, our columns are open to constructive criticism.

SCHOOL GATE COMPETITION

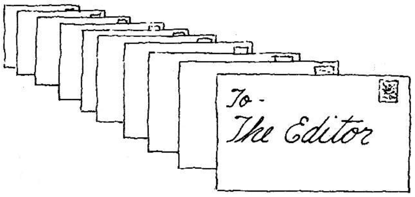
We had hoped to publish in the January issue of the Quarterly the result of the competition, sponsored by the Corps Association, for the design of a suitable Gate for the RCEME School. Unfortunately we are still unable to do so.

All the entries were submitted to Professor H. H. Madill of Toronto University, for judgment. However, while he felt that a number of the designs showed promise, there was no one design which was outstanding enough to win the first prize and, at the same time, meet the architectural requirements of the site.

In view of this, the Executive Committee of the Corps Association have decided not to award the prize at the present time, but to continue the competition, with fuller details as to construction being supplied to contestants. An architect will draw up a specification, which will serve as a guide to contestants in making up their designs.

All contestants' entries have therefore been returned to them, and the new terms of the competition, and details of the architects specifications will be published as soon as possible.

Letters



16 Glen Stewart Avenue,
Toronto 8, Ontario,
May 7, 1951.

Dear Sirs:

..........I might, at this moment, add a word of appreciation to all those whose efforts make this publication possible. When I have read it from cover to cover, it is passed on to several ex-RCEME members before returning to me for future need or reference.

. May this good publication continue to do this worthwhile job.

Grant E. Davidson, P Eng.

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Roberts Hall,
The Military College of Science,
Shrivenham, near Swindon,
Wilts., England
April 4, 1951.

The Editor,
RCEME Quarterly.

Dear Sir:

The arrival of the January Quarterly at Easter reminded me that a few comments were called for in respect of Capt Sergi's article on the MC of S in the previous issue (Oct 50). These are occasioned by changes which have occurred since Capt Sergi's sojourn here.

With regards to living accommodation the situation at present is that there is not much to choose financially between living in Government quarters and living outside, and the choice depends largely upon the individual and the luck he has in obtaining outside accommodation. These days one cannot obtain "practically any accommodation by simply outbidding the British officers" because one has also a large number of USA officers, stationed at some of the nearby airfields, to contend with. Good outside accommodation is not easy to find.

The scheme for the Second Year at the College is, briefly, as follows: There are now three definite courses of study to choose from, and these are listed below with their compulsory subjects.

Weapons Course

Main Subjects	Subsidiary subjects
Heat engines (weapons)	Metallurgy
Machines (weapons)	Special statistics
Applied chemistry	Works organization
Ballistics	

Fighting Vehicles Course

Main subjects	Subsidiary subjects
Machines (vehicles)	Elec Eng'g (vehicles)
Heat engines (motors)	Armour
	Ballistics
	Engineering physics
	Special statistics
	Tels (vehicles)
	Works organization
	Metallurgy

Fire Direction Course

Main subjects	Subsidiary subjects
Eng'g physics I	Ballistics
Elec Eng'g I	Works organization
Electronics	Special statistics

PLUS three out of the following four specialist subjects:

(1) Engineering physics II
(2) Electrical engineering II or Telecommunications
(3) Radar
(4) Ballistics or Propagation

(To give some idea of the importance of specialist subjects, they take approximately two-thirds the time of a Fire Direction Main Subject, whilst a Subsidiary (compulsory) is about one eighth.)

In addition, each course must have an additional three or four subsidiaries which are not compulsory but are the choice of the student.

E. C. Ilott, Capt

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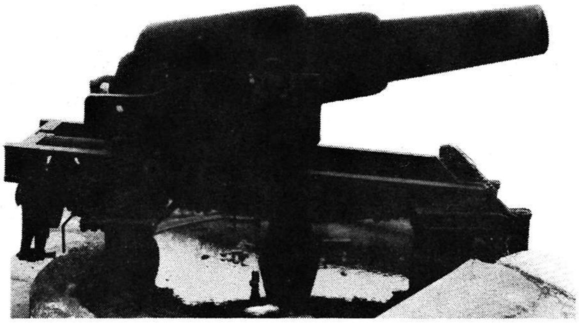
22 Ontario Ave
Ottawa, Mar 20, 1951

The Editors
The RCEME Quarterly

Sirs:

Your article in the April 1951 issue of the Quarterly on the 9 inch RML gun set a train of thoughts moving. It seemed to me your readers might be interested in some further details on this fine weapon.

The gun detachment consisted of a gun captain, gun layer and only seven men, and it was really hard work to serve the gun. Before we commenced drill, we had to draw from store a wonderful miscellany of articles and I can recall the following items: hydro-clinometer, tangent sights, tubes, lanyard, pricker, vent-server, wedge-wads, selvagees, fuses (including the



famous wooden time-fuse), side-arms, sponger and a gadget called a 'searcher'. The latter as far as I can remember, consisted of a sort of screw-picket with a long wooden handle, and numbers 2 and 3 of the gun crew had to search the bore to see that no articles were lodged there. On one occasion we 'hooked' a pair of blue serge pants, planted there by some recalcitrant RGA gunner.

I am assured that at some Stations abroad, the old muzzle-loaders often proved a convenient cache for contraband, etc— hence the 'searcher'.

At drill, after going through the motions of loading, the gun was run up by gravity into the firing position. Numbers 4 and 5 were responsible for this operation, after they had removed the glass windows from the ports of the casemate. On one occasion at the Old Fort at Weymouth, (1900) I omitted to carry out this important duty, and in consequence the muzzle of the gun simply obliterated the old sash window! I was duly charged with neglect of duty, and I had to pay for a new window!

The old wooden time-fuses, (I am still the proud possessor of one) which were introduced about 1881, caused us a lot of amusement. They were packed twelve in a box and had to be stowed upside down, to prevent the RFG2 settling. As they were conical in shape, the compartments in the box were suitably shaped to take them upside down. But the pundits of the day, who always played for safety, had the following legend stencilled on the box:

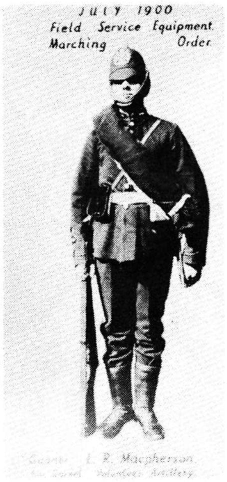
> "These fuses should be stored upside down; to avoid confusion the top of the box is labelled BOTTOM."

We spent many hours trying to probe the erudite mind of the originator of this epic —he certainly must have had a sense of humour! I am reminded of the exhaustive nature of the drill on these old guns. In the first place our kit would be termed crazy to-day. In winter, we drilled in blue cloth trousers and tunics, with a linen canvas overall worn over them! As a result we could hardly move. In summer we were allowed to remove our blue cloth tunics, but still had to wear the heavy canvas overalls. At actual target-practice with live ammunition in summer the interior of the casemate, filled with acrid fumes of gun powder and a dense fog; the raucous shouts of the gun captain, and the umpires (Regular RGA) chipping in, all seemed like some nightmare from Dante's Inferno. The Regular Army regarded us poor Volunteers as a menace and a common danger, but despite all this, we did register on our target, and never hit any of the coast-wise shipping, as the umpires said we would! And we could fire a round in just over a minute.

Yes. Those were the days!

Sincerely

E. Rivers-MacPherson



(Many thanks to Col MacPherson, late of the RGA and RAOC, for his interesting remarks. For local color, we also extracted from him a photo of himself in the kit of the day, taken when he was sixteen years of age. Eds)

MORE ON THE T34

At a meeting toward the end of World War II British and Soviet tank experts were discussing the T34. The British experts conceded the Russian tank had a fine engine, good armament and was hard to hit. But they pointed out it had a very unwieldy clutch. The Russians agreed: "Sure it has. But this is a simple clutch to make and we needed a lot of them in a hurry." The British said the hatch on the Russian tank was extremely heavy and cumbersome and provided the only means of escape if the tank was hit. The Russians' reply was: "If the tank gets hit what good is the crew, anyway?" Finally the British said: "Your tank has cramped quarters. Where does the crew stow its rations and blankets?" The Russians replied: "They don't need blankets and the food is back in the kitchen."

(Nicholas Ignatieff in Maclean's Magazine.)

Co-operation

In our editorial in the last issue of this journal we said that RCEME should be unnoticed .... Very occasionally however, we do get thrown a bouquet. Below is given a heart-warming expression of appreciation, written by a retiring OC of a Corps School to the OC of the workshop at that Camp. To avoid embarrassment names are omitted, but as they say in the patent medicine ads, "the original is open to inspection."

"An obscure French soldier by the name of Napoleon is alleged to have stated that an army marches on its stomach. Had Monsieur Bonaparte been born a century and a half later he would have realized that it would be more correct to say that a modern army marches leaning heavily on its RCEME crutch, and when the crutch breaks down so does the army. If this confused analogy is applicable to a mechanical army at war, it is certainly every bit as applicable to the function of an Armoured School in peace time.

"Napoleon studied the innards of.his men"

A few days ago we completed our third year of post war operation. They have been three busy years, but Ifeel that they have been crowned with some success. Now I, and many of the officers who have served with me, are departing, but before we go I would like to express to you our very sincere appreciation of all that you and your officers and men have done for this School over the past three years. Not only have you helped us keep our vehicles on the road, but your willing co-operation in many of our training aid projects has made all the difference between a mediocre School and a first rate School. I feel our School is first rate and I attribute a very considerable measure of its success to the initiative and enthusiasm and the desire to co-operate which the officers and other ranks of 205 Base Workshop have always exhibited. I would be most appreciative if you would indicate to your officers and men how much we appreciate this co-operation and how much we have appreciated our close association with your unit over the past three years."

Contributed by Capt H.F. Protheroe RCEME

(AEME BC AREA continued from page 35)

serve units once a year. One complete tour of all units, including Vancouver Island and Prince Rupert, is over 3500 miles. Part of this tour is by air or sea and the remainder by road.

The weather is varied with perhaps a little too much rain and fog. There is a saying in Vancouver which goes like this—"If you can see the mountains it is going to rain and if you can't see them it is raining". The Vancouverites will shoot me for this quotation, but I will say I really did experience some lovely summer days as well.

The last two years brought unusually severe weather during the winter in Vancouver. Over 40 inches of snow had fallen up to the end of January 1950. Trucks and cars required chains, and antifreeze to protect their cooling systems. Temperatures in Vancouver dropped to zero on many days and cracked engine blocks were frequent. A ski meet took place within a few hundred yards of HQ BC Area at the end of January, 1950.

If one is fond of fishing and boating it is all here. My delight was to hoist sail on my little sloop, the 'Bonnie' and head for the open sea, dragging of course several fishing lines. How pleasant to slip down to the Jericho Dock after work and hoist sail and spend a few hours on English Bay before dark. You may (if you are lucky) take home a salmon for supper.

To sum up, I can only say that I have just completed the two most interesting and educational years of my army career to date. My new posting is to Prairie Command and no doubt new experiences await me there. They may even have a flood there. (P.S. They did!)

All the articles in this issue have been written by RCEME personnel especially for the RCEME Quarterly, except the excerpt from the Epsom and Ewell Advertiser" on page 29.

PERSONALITIES

PROMOTIONS

To be Major:

H. C. Banham, Admin Officer RCEME School

To be Captain:

S. A. Girdler, OC 159 LAD

To be Lieutenant:

J. O. Sheehan, 202 Base Workshop

POSTINGS

MAJORS

- E. M. Brignell, OC 20 Coy Wainwright, Alta
- W. A. Down, OC 3 Coy
- R. K. Fulford, 202 Base Workshop
- R. C. Lane, OC 25 Support Workshop
- G. L. Lodge, OC 194 Inf Workshop
- G. W. Thompson, DADME, 27 Inf Bde

CAPTAINS

- J. Adams, CJATC
- J. N. Campbell, 5 Sec A & T Staff
- H. L. Cohen, CI RCEME School
- J. J. Cuddihey, 2 Coy
- J. B. Dewhurst, MC of S
- B. Diebert, MC of S
- A. D. Grinham, RCEME School
- H. V. Hann, 194 Inf Workshop
- E. J. Harvey, D Org AHQ
- W. H. Hawkins, 6 Coy
- A. J. Jeffery, 11 Coy
- J. L. Loughridge, OC 211 Base Wksp
- A. G. Maitland, GSO III, DWD AHQ
- J. A. McKinnon, 11 Coy
- H. McManus, 214 Base Wksp
- M. M. Morgan, RCEME School
- A. B. Otto, 205 Base Workshop
- M. R. Robinson, RCEME School
- F. J. Sergie, DVD AHQ
- J. L. Sloan, 194 Inf Wksp
- S. G. Tait, Vehicle Gp, DEME
- A. R. Thomsen, D Pers (RCEME) AHQ
- J. M. Treleaven, VPE Pvg Det Ottawa
- P. A. Tuck, 197 LAD
- R. W. Vollett, MC of S
- B. Yarymowich, HQ RCEME Quebec Comd

LIEUTENANTS

- W. D. Alexander, 206 Wksp
- G. E. Ball, RCEME School
- F. W. Chapman, 25 Bde Reinf
- J. S. Crowson, 2 Coy
- R. J. Evans, 25 Bde Reinf
- W. J. Haggins, HQ RCEME Cent Comd
- R. H. Hogue, 202 Base Wksp
- W. M. James, 2 Armd Regt, 25 Bde
- J. A. MacDonald, 16 Coy
- R. E. Rodgers, 25 Bde Reinf
- R. H. Sandilands, 194 Inf Wksp
- R. J. Tevlin, RCEME School
- W. W. Virtue, RCEME School

2/Lieut W. R. Willing, RCEME School

APPOINTED TO COMMISSION IN RCEME

- Major R. E. Hallam, 191 Inf Wksp (16 Mar 51)
- Capt G. C. Craft, DAD AHQ
- Capt A. M. Croft, EME Course, RCEME School
- Capt W. Rhodes, 202 Base Workshop
- Capt J. D. Trevithick, 2 Coy
- Lieut P. Bateson, 6 Coy
- Lieut T.E. Duffield, EME Course, RCEME School
- Lieut C. A. Hurst, 11 Sec A & T Staff
- Lieut K. S. Parton, 10 Coy

APPOINTED CLASSIFIED OFFICERS

- Lieut H. A. Popkin, DEME AHQ
- Lieut J. McIntyre, 16 Coy

The following 2/Lieuts are on Basic Officers' Course RCEME School:

- B. E. Babcock
- P. E. Bessey
- H. R. Cavanagh
- R. D. Connell
- J. N. Courtney
- E. B. Creber
- T. E. Duffield
- K. F. Duggan
- P. E. Hansen
- K. T. Kennah
- N. E. Laviolette
- W. F. Lucans
- J. G. Metcalf
- A. J. MacGillivray - from RCASC
- R. H. MacLeod - from RCASC
- J. C. Ormond
- R. Peters
- W. E. Royds
- G. A. St Onge
- J. A. Stott
- J. K. Sullivan - from RC Sigs

PERSONALITIES continued

Under the provisions of AGI 425 (1951), two warrant officers class I, J.S. McIntyre, 16 Coy RCEME Whitehorse, and H.A. Popkin, DEME Ottawa, have been commissioned as Classified Officers.

'Classified' officers are ex-WOs with appropriate qualifications, certain educational qualifications, 10 years full time service, and under forty years of age.

In RCEME these are known as Executive Officers. They must be qualified as Artificer Gp 4 or the highest group in RCEME clerical trades and familiar with workshop administration and accounting procedure.

Twenty three other ranks have been appointed to 'Short Service Commissions' in RCEME for a three, four or five year term (as elected by the candidate), under the provisions of AGI 470 (1951).

WO1 M.E. Conway, RCEME School
WO1 A.S. Etter, RCEME School
WO1 C.H. Gladwin, 6 Coy
WO1 G.M. Hagan, 3 Coy
WO1 E. MacMillan, RCEME School
WO1 J.F. O'Connor, RCEME School
WO1 H.R. Perry, 17 Coy
WO1 W.A. Thomas, RCEME School
WOII G.F. Bews, RCEME School
WOII L.N. Bydal, DEME
WOII H.T. Edworthy, DEME
WOII R.V. Hill, RCEME School
WOII D.M. Mahar, DEME
WOII D.J. Seabrook, 3 Coy
WOII P.G. Vyvyan, RCEME School
S/Sgt F.N. Brodie, 3 Coy Picton
S/Sgt P.L. Burcombe, 23 Comp Bde Wksp
S/Sgt J.H. Cooper, RCEME School
S/Sgt J.J. Klinec, DE&CD
S/Sgt J.A. Richards, 23 Comp Bde Wksp
S/Sgt C.E. Smith, RCAC School
S/Sgt G.G. Stewart, 23 Comp Bde Wksp
Sgt W.G. Barry, 6 Coy

These NCOs will be appointed Officer Cadets effective 16 Jul, the day of arrival at RCEME School to commence officer training. Here the program "will be based upon the individual's past training and experience and will be approximately two months' duration."

SHARE YOUR QUARTERLY!

As we have said before, a nice bright unsullied Quarterly lying deep in someone's drawer defeats the purpose of the magazine. Don't let this happen to you. PASS THIS QUARTERLY TO AT LEAST ONE OTHER.

The publication of a magazine at three-monthly intervals presents a rather unique problem. At least, it appears so to us. It seems to be that the period between issues is so long that contributors allow themselves to be lulled to sleep after each issue appears. Suddenly the 'alarm' rings (at the last moment, as is invariably the custom with such things) and they -- the aforementioned authors -- are awakened to the need of another contribution to THEIR Quarterly. So the news is gathered up in a hurry and sent off to the editor. We had an extreme example of this quite recently when we received (on July 7) the report of a meeting held on May 16. And we now have air-mail at 4¢.

On the other hand, if the magazine were published every month -- or every week -- the demand for news would seem to be continuous and contributions would more than likely arrive the same way.

Can we not persuade our correspondents to keep the flow continuous, rather than using the present 'just beat the deadline' method? We have to plan each issue two months or so ahead of printing date because the makeup system we use demands considerable time. Invariably an issue is more or less complete from the copy at hand when the belated stories start to pour in. Naturally something has to be left over if the news is to be printed while it is still news.

POST SCRIPT TO SUGGESTION BOX

Asked to submit (as per page 3 of this issue) details of "..a little gadget..avoids bottlenecks in paper work..exceptionally fine layout..an excellent best of the difficulties under which nature or QMG branch have compelled them to work," a wag from 1 Coy RCEME sent us the above picture. We welcome the charming young lady to our pages.

Summary of Automatic Transmissions

		Fluid Coupling Types		Torque Converter Types			
(See story on page 21)	Drivemaster Hudson	Simplimatic Chrysler DeSoto Dodge	Hydra-Matic Oldsmobile Pontiac Cadillac Lincoln -- Nash	Dynaflow Buick	Ultra matic Packard	Borg-Warner Studebaker	Powerglide Chevrolet
Automatic Ratios Provided	2	2	4	Unlimited	Unlimited	Unlimited	Unlimited
Maximum Torque Multiplication In Fluid Unit	None	None	None	2.25 to 1	2.40 to 1	2.30 to 1	2.20 to 1
Type Of Fluid Unit	None	Fluid Coupling	Fluid Coupling	5 Element Single Stage Converter	3 Element 2 Stage Converter	3 Element Single Stage Converter	5 Element Single Stage Converter
Has Transmission A Clutch?	Yes	Yes	No	No	Yes - automatically engages at 13 to 50 mph	Yes - automatically engages at 18 to 58 mph	No
Total Ratios Provided	3 (plus optional overdrive)	4	4	Unlimited	Unlimited	Unlimited	Unlimited
How is Upshift Accomplished?	Releasing accelerator above 13 mph	Using foot clutch while selecting range then by releasing accelerator	Automatic - varying with speed and accelerator position	Unlimited converter action	Unlimited converter action - direct drive engaged automatically	Unlimited converter action - direct drive engaged automatically	Unlimited converter action
Has Car A Clutch Pedal?	Yes (vacuum actuated)	Yes	No	No	No	No	No
Engine Connection to Transmission	Wet clutch	Fluid coupling and dry clutch	Fluid Coupling	Torque converter - acting as fluid coupling at high speed ratios	Torque converter - then direct clutch	Torque converter - then direct clutch	Torque converter - acting as fluid coupling at high speed ratios
How Is Car Towed?	In neutral - no special precautions	In neutral - no special precautions	Remove drive shaft - or lift rear end and tow backward on front wheels	In neutral - do not exceed 30 mph	In neutral - no special precautions	In neutral - do not exceed 30 mph	In neutral

Note - Never Tow any car with an automatic transmission when attempting to start the engine.
ALWAYS PUSH. If the engine starts suddenly the car is likely to take off in a hurry.

RCEME QUARTERLY CHART